GW - 39

PERMITS, RENEWALS, & MODS

CLOSED

elpaso Field Services

Certified Mail: #7002 0510 0000 0307 7411

March 23, 2004

Mr. William C. Olson
New Mexico Oil Conservation Division
1220 St. Francis Dr.
Santa Fe, NM 87504

RE: 2003 ANNUAL REPORT FOR THE JAQUEZ COM E #1 AND C #1 AND THE SAN JUAN RIVER PLANT

Dear Mr. Olson:

El Paso Field Services (EPFS) hereby submits the 2003 Annual Report for the Jaquez Com E #1 and C #1 located near Blanco, New Mexico and the San Juan River Plant located near Kirtland, New Mexico. The enclosed reports detail the remediation and sampling activities for the year 2003.

If you have any questions concerning the enclosed reports, please call me at (505) 599-2124.

Sincerely,

Scott T. Pope P.G.
Senior Environmental Scientist

Enclosures: as stated

xc: Mr. Denny Foust, NMOCD, Aztec - w / enclosures; **Certified Mail # 7002 0510 0000 0307 7435**
Mr. John Jaquez, Landowner, Jaquez Report Only - w / enclosures; **Certified Mail # 7002 0510 0000 0307 7428**

El Paso Field Services
614 Reilly Ave. Farmington, NM 87401

elpaso Field Services

Certified Mail: #7001 1940 0002 1371 7690

March 31, 2003

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APR 0 2 2003

ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Mr. William C. Olson
New Mexico Oil Conservation Division
1220 St. Francis Dr.
Santa Fe, NM 87504

RE: 2002 ANNUAL REPORT FOR THE JAQUEZ COM E #1 AND C #1 AND THE SAN JUAN RIVER PLANT

Dear Mr. Olson:

El Paso Field Services (EPFS) hereby submits the 2002 Annual Report for the Jaquez Com E #1 and C #1 located near Blanco, New Mexico and the San Juan River Plant located near Kirtland, New Mexico. The enclosed reports detail the remediation and sampling activities for the year 2002.

If you have any questions concerning the enclosed reports, please call me at (505) 599-2124.

Sincerely,

Scott T. Pope

Scott T. Pope P.G.
Senior Environmental Scientist

Enclosures: as stated

xc: Mr. Denny Foust, NMOCD, Aztec - w / enclosures; **Certified Mail # 7001 1940 0002 1371 7683**
Mr. John Jaquez, Landowner, Jaquez Report Only - w / enclosures; **Certified Mail # 7001 1940 0002 1371 7706**

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

BILL RICHARDSON
Governor
Joanna Prukop
Cabinet Secretary

Lori Wrotenbery
Director
Oil Conservation Division

January 15, 2003

CERTIFIED MAIL
RETURN RECEIPT NO. 7001-1940-0004-3929-7129

Mr. Scott Pope
El Paso Field Services
614 Reilly Avenue
Farmington, New Mexico 87401

RE: CASE # GW039R
GROUND WATER REMEDIATION AND MONITORING
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

Dear Mr. Pope:

The New Mexico Oil Conservation Division (OCD) has reviewed El Paso Field Services' (EPFS) March 27,2001 correspondence titled "2001 ANNUAL REPORT FOR THE JAQUEZ COM E#1 AND C#1 AND THE SAN JUAN RIVER PLANT" and accompanying April 2002 "ANNUAL REPORT SAN JUAN RIVER PLANT SITE-WIDE SAMPLING AND HYDROCARBON REMEDIATION". These documents contain the results of EPFS's ground water remediation and monitoring at the San Juan River Plant in Kirtland, New Mexico. The documents also request a change in the sampling frequency of monitor well MW-5 from quarterly to annual sampling.

The above-referenced request is approved. Please be advised that OCD approval does not relieve EPFS of responsibility if the monitoring program fails to adequately monitor contamination related to EPFS's activities. In addition, OCD approval does not relieve EPFS of responsibility for compliance with any other federal, state or local laws and regulations.

If you have any questions, please call me at (505) 476-3491.

Sincerely,

William C. Olson
Hydrologist
Environmental Bureau

cc: Denny Foust, OCD Aztec District Office

elpaso Field Services

Certified Mail: #7001 1940 0003 8582

RECEIVED

APR 01 2002

ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

March 27, 2001

Mr. William C. Olson
New Mexico Oil Conservation Division
1220 St. Francis Dr.
Santa Fe, NM 87504

RE: 2001 ANNUAL REPORT FOR THE JAQUEZ COM E #1 AND C #1 AND THE SAN JUAN RIVER PLANT

Dear Mr. Olson:

El Paso Field Services (EPFS) hereby submits the 2001 Annual Report for the Jaquez Com E #1 and C #1 located near Blanco, New Mexico and the San Juan River Plant located near Kirtland, New Mexico. The enclosed reports detail the remediation and sampling activities for the year 2001.

If you have any questions concerning the enclosed reports, please call me at (505) 599-2124.

Sincerely,

Scott T. Pope

Scott T. Pope P.G.
Senior Environmental Scientist

Enclosures: as stated

xc: Mr. Denny Foust, NMOCD, Aztec - w / enclosures; **Certified Mail # 7001 1940 0003 1553 8599**
Mr. John Jaquez, Landowner, Jaquez Report Only - w / enclosures; **Certified Mail # 7001 1940 0003 1553 8575**

From: Pope, Scott [Scott.Pope@ElPaso.com]
Sent: Tuesday, November 27, 2001 9:02 AM
To: 'Bill Olson'
Cc: 'Lynn Benally'; 'Neil Wrubel'; 'Valda I.Terauds'
Subject: Remediation at the San Juan River Plant

Bill,

As we discussed in our November 26, 2001, phone conversation, after several attempts to install a sparge well up gradient of MW-8 at the San Juan River Plant were unsuccessful due to auger refusal, a sparge well was eventually installed. The sparge well could only be advanced to a depth of 15 feet which was 6 feet above the target depth of 21 feet. After attempting to develop the well by surging with potable water, only .4 feet of water would accumulate in the well. A preliminary sparge test was conducted using a compressor while pressure and dissolved oxygen (DO) readings were observed in MW-8. No changes were noted in pressure or DO in MW-8, indicating no communication between the sparge well and the monitoring well. As discussed with Valda Terauds of Montgomery Watson Harza, the most appropriate remedy for MW-8 at this point would be the installation of an Oxygen Release Compound (ORC) sock. Based on our phone call we understand this remedy has been approved and the ORC sock will be installed.

Installation of the sparge well up gradient of MW-9 was very difficult as well and preliminary tests did indicate communication is occurring between the sparge and monitoring wells. The sparge system at MW-9 will be installed and pilot tested as approved. A final report will be submitted following the conclusion of the 8 week sparge test. The report will detail the drilling attempts, results from the preliminary sparge tests, installation of the sparge system and 8 week pilot test.

If you have any additional questions or concerns please contact me at (505) 599-2124 or Valda Terauds at (505) 878-1430.

Sincerely,

<<...OLE_Obj...>>
Scott T. Pope P.G.
Senior Environmental Scientist
Environmental Remediation Department
(505) 599-2124
(505) 599-2119 Fax

DP-39

elpaso
El Paso Corporation

614 Rielly Avenue
Farmington, NM 87401
(505) 599-2124

OIL CONSERVATION DIV.
01 SEP 24 PM 1 53

Certified Mail # 7000 1670 0012 7260 9150

September 19, 2001

Mr. William C. Olson
New Mexico Oil Conservation Division
1220 St. Francis Dr.
Santa Fe, NM 87504

RE: Revised Work Plan for Groundwater Remediation for the San Juan River Plant

Mr. Olson;

El Paso Corporation (EPC), hereby submits the attached "Revised Work Plan for Groundwater Remediation for the San Juan River Plant (SJRP)", prepared by Montgomery Watson Harza. The initial work plan for the SJRP was submitted January 24, 2001 and approved June 4, 2001. After review of the initial plan and site visit, modifications to the initial work plan were discussed and the following changes were made to the initial work plan.

1. Revise sparging pilot test to 8 weeks from 4 weeks identified in initial work plan. There is a better chance of seeing measurable results in a subsurface system that has to change from oxygen-poor to an oxygen-rich environment with the attendant changes in microbial populations.

2. Revise groundwater sampling periods as follows: prior to installation, four weeks and at conclusion of 8 week sparge period. The sparge system will be shut down 48 hours prior to sample collection.

3. The overall operating period will be changed from a twelve hour pulsing versus eight hour pulsing. This is better suited to distributing oxygen and will employ the use of a timer to eliminate visits by subcontractor.

If you have any comments or questions regarding the modifications to the original work plan please call me at (505) 599-2124 or Lynn H. Benally at (505) 599-2178. The project is estimated to begin on October 19, 2001.

Sincerely,

Scott T. P

Scott T. Pope P.G.
Senior Environmental Scientist
Environmental Remediation Department

Attachments: as stated

xc: Denny Foust, NMOCD Aztec District, Certified Mail # 7000 1670 0012 7260 9143

NEW MEXICO ENERGY, MINERALS and
NATURAL RESOURCES DEPARTMENT

GARY E. JOHNSON
Governor
Jennifer A. Salisbury
Cabinet Secretary

Lori Wrotenbery
Director
Oil Conservation Division

June 4, 2001

CERTIFIED MAIL
RETURN RECEIPT NO. 3771-7323

Mr. Scott Pope
El Paso Energy Corporation
614 Reilly Avenue
Farmington, New Mexico 87401

RE: CASE # GW039R
GROUND WATER MONITORING RESULTS AND REMEDIATION WORK PLAN
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

Dear Mr. Pope:

The New Mexico Oil Conservation Division (OCD) has reviewed El Paso Energy Corporation's (EPEC) January 24, 2001 "WORK PLAN FOR GROUNDWATER REMEDIATION AND 2000 GROUNDWATER SAMPLE RESULTS FOR THE SAN JUAN RIVER PLANT" and accompanying December 2000 "SAN JUAN RIVER PLANT, GROUNDWATER REMEDIATION WORK PLAN". These documents contain the results of EPEC's ground water monitoring and a proposed work plan for additional remediation of contaminated ground water at the San Juan River Plant in Kirtland, New Mexico.

The above referenced work plan is approved with the following conditions:

1. On an annual basis EPEC shall sample and analyze ground water from all existing site monitor wells for concentrations of benzene, toluene, ethylbenzene and xylene (BTEX), nitrates, total dissolved solids and New Mexico Water Quality Control Commission (WQCC) metals and cations and anions using EPA approved methods and quality assurance/quality control procedures.

   Note: This sampling was required in the OCD's October 13, 1999 approval of EPEC's ground water remediation plan due to exceedances of WQCC standards in ground water at various points throughout the plant.

2. EPEC shall submit the as built construction information on the air sparge system to the OCD in the subsequent annual report.

3. All wastes generated shall be disposed of at an OCD approved facility.

4. EPEC shall notify the OCD at least 1 week in advance of all scheduled activities such that the OCD has the opportunity to witness the events and split samples.

Please be advised that OCD approval does not relieve EPEC of liability if contamination exists which is beyond the scope of the work plan, or if the activities fail to adequately remediate and monitor contamination related to EPEC's activities. In addition, OCD approval does not relieve EPEC of responsibility for compliance with any other federal, state or local laws and regulations.

If you have any questions, please call me at (505) 827-7154.

Sincerely,

Bill Olson

William C. Olson
Hydrologist
Environmental Bureau

xc: Denny Foust, OCD Aztec District Office

EL PASO ENERGY

Certified Mail: # Z 213 707 479

JAN 29 [illegible]
SERVATION DIVIS

January 24, 2001

Mr. William C. Olson
New Mexico Oil Conservation Division
2040 S. Pacheco
Santa Fe, NM 87504

RE: Work Plan for Groundwater Remediation and 2000 Groundwater Sample Results for the San Juan River Plant

Dear Mr. Olson:

El Paso Energy Corporation (EPEC) hereby submits the attached "Groundwater Remediation Work Plan" prepared by PSC and 2000 groundwater sample results for the San Juan River Plant near Kirtland, New Mexico. A Work Plan was approved on October 13, 1999 for the injection of an oxygen release compound to aid in the biodegradation of the BTEX compounds above New Mexico Water Quality Control Commission standards. After closer review of the proposed remediation method and associated costs, EPEC has concluded air sparging is a better option for roughly the same costs. In telephone conversations you have indicated you would be willing to review the Work Plan for the implementation of a sparge system for groundwater remediation in place of the approved oxygen release proposal at the site.

In the interim period of reviewing remediation technologies, new project management and preparing the enclosed Work Plan, quarterly groundwater monitoring has continued at the site. Groundwater sample results for the year 2000 are presented in the attached Table 1. Original laboratory reports are also included as an attachment to this letter.

Most of the parameters sampled for during the year 2000 were related to natural attenuation, with the exception of BTEX. Since we have a years worth of data showing which natural attenuation parameters we are deficient in at the site, EPEC requests that sampling be limited to BTEX only, until remediation activities indicate the need for additional tests.

If you have any questions or require any additional information, please contact me at (505) 599-2124.

Sincerely,

Scott T. Pope

Scott T. Pope P.G.
Senior Environmental Scientist

Enclosures: as stated

xc: Mr. Denny Foust, NMOCD – Aztec – Certified Mail # Z 213 707 480

El Paso Energy Corporation 614 Reilly Avenue Farmington, New Mexico 87401 Phone (505) 325-2841 Fax (505) 599-2119

TABLE 1

San Juan River Plant
Groundwater Results 2000
(Page 1 of 1)

Sample #	Site Name	Sample Date	MW #	Iron mg/L	Manganese mg/L	Ammonia - N mg/L	Nitrate-N mg/L	Nitrite-N mg/L	Orthosphosphate-P mg/L	Sulfate mg/L	TKN mg/L	Benzene ug/L	Toluene ug/L	Ethylbenze ug/L	Total Xylenes ug/L
F00-0043	San Juan River Plt	4/10/2000	MW-5	0.12	3.3	1.8	ND	ND	ND	16000	4.8	ND	ND	ND	ND
F00-0155	San Juan River Plt	6/29/2000	MW-5	0.38	3.3	0.9	ND	ND	ND	16000	2.7	ND	ND	ND	ND
F00-0198	San Juan River Plt	9/29/2000	MW-5	0.24	1.8	0.78	ND	ND	ND	14000	1.7	ND	ND	ND	ND
F00-0350	San Juan River Plt	12/21/2000	MW-5	0.59	0.026	1.1	ND	ND	ND	14000	0.98	2.2	ND	ND	9.1
F00-0044	San Juan River Plt	4/10/2000	MW-8	2.7	9.2	1.3	ND	ND	ND	12000	5.9	48	2.1	4.7	5.9
F00-0156	San Juan River Plt	6/29/2000	MW-8	0.32	3.6	ND	ND	ND	0.04	7500	1.8	24	ND	ND	ND
F00-0199	San Juan River Plt	9/29/2000	MW-8	0.32	1.6	ND	ND	ND	0.076	8500	2	284	ND	6.6	ND
F00-0351	San Juan River Plt	12/21/2000	MW-8	0.16	0.011	1.8	ND	ND	ND	12000	2	ND	ND	ND	6.7
F00-0045	San Juan River Plt	4/10/2000	MW-9	1.8	2.4	ND	ND	ND	0.04	5000	3.4	200	4.4	ND	9.5
F00-0157	San Juan River Plt	6/29/2000	MW-9	0.85	8.5	2.7	ND	ND	0.02	11000	4.6	100	ND	9.2	ND
F00-0200	San Juan River Plt	9/29/2000	MW-9	1.2	8.4	1.8	ND	ND	0.018	11000	3.2	95	ND	11	9
F00-0352	San Juan River Plt	12/21/2000	MW-9	0.34	0.11	0.34	ND	ND	0.029	3800	0.42	86	ND	7.1	12

TKN = Total Kjeldahl Nitrogen
ND = Not Detected
mg/L = Miligrams per Liter
ug/L = Micrograms per Liter

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
2040 S. PACHECO
SANTA FE, NEW MEXICO 87505
(505) 827-7131

October 13, 1999

CERTIFIED MAIL
RETURN RECEIPT NO. Z-274-520-716

Mr. Bryan Gay
El Paso Energy Corporation
P.O. Box 2511
Houston, Texas 77252-2511

RE: GROUND WATER REMEDIATION WORK PLAN
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

Dear Mr. Gay:

The New Mexico Oil Conservation Division (OCD) has reviewed El Paso Energy Corporation's (EPEC) August 31, 1999 "AMENDED SCOPE OF WORK ASSOCIATED WITH BTEX CONTAMINATION IN GROUND WATER, SAN JUAN RIVER PLANT, KIRTLAND, NEW MEXICO" and June 2, 1999 "PROPOSED SCOPE OF WORK ASSOCIATED WITH BTEX CONTAMINATION IN GROUND WATER, SAN JUAN RIVER PLANT, KIRTLAND, NEW MEXICO". These documents contain EPEC's proposed work plan for remediation and monitoring of contaminated ground water at the San Juan River Plant in Kirtland, New Mexico.

The above referenced work plans **are approved** with the following conditions:

1. On an annual basis EPEC shall sample and analyze ground water from all site monitor wells for concentrations of benzene, toluene, ethylbenzene and xylene (BTEX), nitrates, total dissolved solids and New Mexico Water Quality Control Commission (WQCC) metals and cations and anions using EPA approved methods and quality assurance/quality control procedures.

2. EPEC shall submit an annual report on the results of the remediation and monitoring activities to the OCD by April 1 of each year. The report shall be submitted to the OCD Santa Fe Office with a copy provided to the OCD Aztec District Office and shall contain:

    a. A description of all remediation and monitoring activities conducted during the past calendar year.

   b. A map for each sampling event showing all former source areas, pit locations, excavated areas, monitor well locations, injection wells and the direction and magnitude of the hydraulic gradient.

   c. Isopleth maps of contaminants of concern for each sampling event.

   d. Summary tables of all water quality sampling results and copies of all recent laboratory analytical data sheets and associated quality assurance/quality control data.

   e. The disposition of all wastes generated.

   f. The composition of any material used for insitu bioremediation of contaminants.

3. All wastes generated shall be disposed of at an OCD approved facility.

4. EPEC shall notify the OCD at least 1 week in advance of all scheduled activities such that the OCD has the opportunity to witness the events and split samples.

5. Ground water quality monitoring shall continue until sampling analyses show that the contaminants in ground water which are related to EPEC's activities are below WQCC standards for 8 consecutive quarters.

Please be advised that OCD approval does not relieve EPEC of liability if contamination exists which is beyond the scope of the work plan, or if the activities fail to adequately remediate and monitor contamination related to EPEC's activities. In addition, OCD approval does not relieve EPEC of responsibility for compliance with any other federal, state or local laws and regulations.

If you have any questions, please call me at (505) 827-7154.

Sincerely,

Will Olson

William C. Olson
Hydrologist
Environmental Bureau

xc: Denny Foust, OCD Aztec District Office

EL PASO ENERGY

RECEIVED
SEP 7 1999
OIL CONSERVATION DIVISION

August 31, 1999

Mr. Wayne Price
Environmental Bureau
New Mexico Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, NM 87505

Re: ***Amended Scope of Work Associated with BTEX Contamination in Groundwater.***
San Juan River Plant
Kirtland, New Mexico

Dear Mr. Price:

In a previous letter dated June 2, 1999 El Paso Energy proposed to treat BTEX contaminated groundwater using ORC socks placed in impacted groundwater monitoring wells MW-8 and MW-9, located on the northern portion of the San Juan River Plant property. After reconciliation of alternative application processes of the ORC technology El Paso Energy would like to amend the original scope of work accordingly.

As an alternative to placing ORC socks into the monitoring wells El Paso Energy would rather use a drill rig to install a total of 18 soil borings to an approximate depth of 21 feet below ground surface (bgs). Each set of soil borings will be placed around each of the impacted groundwater monitoring wells MW-8 and MW-9, approximately 10 feet apart in a column and row grid arrangement. An ORC slurry (magnesium peroxide and water) is proposed to be injected into each of the boreholes in order to come in contact with the shallow groundwater. Each of the boreholes will be completed from five feet bgs to the surface with a cement/bentonite slurry.

We believe this is a more appropriate strategy than the formally proposed ORC sock installation. With this approach we will avoid disturbing the quality of the samples collected from the currently impacted monitoring wells. In addition, more of the impacted area will be exposed to the ORC, resulting in a greater decrease in the contaminant mass. Sampling of the wells will occur within 72 hours of injecting the ORC slurry and then again every quarter as previously proposed.

As an added note this process has been previously approved by the New Mexico Oil Conservation Division for other sites in the area. According to our field services office located in Farmington, New Mexico these sites approved for ORC injection have been a success.

If you have any questions or comments after reviewing this amendment to the original work plan dated June 2, 1999 please feel free to call me at (713) 420-5947. I have attached the original work plan for your reference.

Sincerely,

Bryan Gay

Bryan Gay, CAPM
Project Environmental Scientist
Environmental Remediation Department

Attachments

June 2, 1999

Mr. William C. Olson
Environmental Bureau
New Mexico Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, NM 87505

Re: ***Proposed Scope of Work Associated with BTEX Contamination in Groundwater.***
San Juan River Plant
Kirtland, New Mexico

Dear Mr. Olson:

As per your discussion with Bryan Gay on Thursday, May 26, 1999 I have enclosed this proposed scope of work associated with the benzene, toluene, ethylbenzene, and xylene (BTEX) contamination in groundwater surrounding monitoring wells MW-8 and MW-9 at the subject site. These wells have been impacted through a historical release at the site. BTEX concentrations above New Mexico Water Quality Control Commission (NMWQCC) standards have been observed in these wells since July 1995. However, BTEX has never been observed in monitoring well (MW-5) located down gradient near the property boundary, therefore; the plume mass appears to be isolated and stable. In addition, benzene concentrations appear to be decreasing through natural processes. A table summarizing groundwater analytical results for MW-5, MW-8, and MW-9 have been attached as ***Table 1***.

The forth-coming proposed activities include the evaluation of parameters associated with the natural attenuation of BTEX in groundwater, the addition of nutrients to impacted wells if necessary, the installation of magnesium peroxide socks to provide an increased source of oxygen to the impacted wells, and continued groundwater monitoring.

El Paso Energy proposes that monitoring wells MW-5, MW-8, and MW-9 be sampled for the following natural attenuation parameters; dissolved oxygen (DO), oxygen reduction potential (ORP), pH, temperature, nitrates, sulfates, and ferrous iron (FeII). DO, ORP, temp, and pH will be measured in the field using New Mexico Oil Conservation Division (NMOCD) approved methods. Nitrates, sulfates, and FeII will be analyzed in the laboratory. A comparison of results from impacted monitoring wells MW-8 and MW-9 and historically documented non-detect monitoring well MW-5 will be used to determine if present conditions are suitable for natural attenuation. If results indicate any nutrient deficiencies, nutrients will be added to wells MW-8 and MW-9 in order to support natural attenuation processes. The addition of nutrients would include the mixing of urea nitrate with potable water at a 1:5 ratio. Hydrogen peroxide should also be added in order to bring the dissolved oxygen concentration of the water to 20 mg/l. The nutrient mixture will be added to the monitoring wells as a supplement to existing nutrients. Prior to the addition of any nutrients (if necessary), monitoring wells MW-5, MW-8, and MW-9 will be sampled and analyzed for BTEX using EPA method 8020. This initial sampling will be used to establish a baseline of BTEX concentrations prior to any assisted natural attenuation. Monitoring well MW-5 will be sampled due to its down gradient location and its history of non-detectable concentrations of BTEX. Hence, monitoring well MW-5 will be sampled to determine if plume migration is occurring.

After the appropriate nutrients have been added to monitoring wells MW-8 and MW-9 (if necessary), each well will be fitted with a magnesium peroxide sock in order to provide a continued source of oxygen to the groundwater. The addition of oxygen to groundwater should increase the rate of aerobic degradation of BTEX constituents in the vicinity of monitoring wells MW-8 and MW-9. Following a minimum of three months (I quarter) the magnesium peroxide socks will be removed from each well. After the well has stabilized for two weeks groundwater samples will be collected from MW-5, MW-8 and MW-9 and analyzed for BTEX using EPA method 8020 and the fore-mentioned natural attenuation parameters. Based on the results of the groundwater monitoring event, additional nutrients and the magnesium socks may be placed into the well for an additional quarter. This process will be continued on a quarterly basis until BTEX concentrations in groundwater are below NMWQCC standards. El Paso Energy proposes to continue groundwater monitoring activities for monitoring wells MW-5, MW-8, and MW-9 for two additional quarters in order to document plume stability and insure BTEX concentrations have been reduced to levels below NMWQCC standards.

Please contact me at (713) 420-3306 with any questions or comments.

Sincerely,

Nancy K Prince, CGWP
Principal Environmental Scientist
Environmental Remediation Department

Attachments

EL PASO
ENERGY

June 2, 1998

RECEIVED

JUN 0 3 1999

ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Mr. William C. Olson
Environmental Bureau
New Mexico Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, NM 87505

Re: ***Proposed Scope of Work Associated with BTEX Contamination in Groundwater.***
San Juan River Plant
Kirtland, New Mexico

Dear Mr. Olson:

As per your discussion with Bryan Gay on Thursday, May 26, 1999 I have enclosed this proposed scope of work associated with the benzene, toluene, ethylbenzene, and xylene (BTEX) contamination in groundwater surrounding monitoring wells MW-8 and MW-9 at the subject site. These wells have been impacted through a historical release at the site. BTEX concentrations above New Mexico Water Quality Control Commission (NMWQCC) standards have been observed in these wells since July 1995. However, BTEX has never been observed in monitoring well (MW-5) located down gradient near the property boundary, therefore; the plume mass appears to be isolated and stable. In addition, benzene concentrations appear to be decreasing through natural processes. A table summarizing groundwater analytical results for MW-5, MW-8, and MW-9 have been attached as ***Table 1***.

The forth-coming proposed activities include the evaluation of parameters associated with the natural attenuation of BTEX in groundwater, the addition of nutrients to impacted wells if necessary, the installation of magnesium peroxide socks to provide an increased source of oxygen to the impacted wells, and continued groundwater monitoring.

El Paso Energy proposes that monitoring wells MW-5, MW-8, and MW-9 be sampled for the following natural attenuation parameters; dissolved oxygen (DO), oxygen reduction potential (ORP), pH, temperature, nitrates, sulfates, and ferrous iron (FeII). DO, ORP, temp, and pH will be measured in the field using New Mexico Oil Conservation Division (NMOCD) approved methods. Nitrates, sulfates, and FeII will be analyzed in the laboratory. A comparison of results from impacted monitoring wells MW-8 and MW-9 and historically documented non-detect monitoring well MW-5 will be used to determine if present conditions are suitable for natural attenuation. If results indicate any nutrient deficiencies, nutrients will be added to wells MW-8 and MW-9 in order to support natural attenuation processes. The addition of nutrients would include the mixing of urea nitrate with potable water at a 1:5 ratio. Hydrogen peroxide should also be added in order to bring the dissolved oxygen concentration of the water to 20 mg/l. The nutrient mixture will be added to the monitoring wells as a supplement to existing nutrients. Prior to the addition of any nutrients (if necessary), monitoring wells MW-5, MW-8, and MW-9 will be sampled and analyzed for BTEX using EPA method 8020. This initial sampling will be used to establish a baseline of BTEX concentrations prior to any assisted natural attenuation. Monitoring well MW-5 will be sampled due to its down gradient location and its history of non-detectable concentrations of BTEX. Hence, monitoring well MW-5 will be sampled to determine if plume migration is occurring.

After the appropriate nutrients have been added to monitoring wells MW-8 and MW-9 (if necessary), each well will be fitted with a magnesium peroxide sock in order to provide a continued source of oxygen to the groundwater. The addition of oxygen to groundwater should increase the rate of aerobic degradation of BTEX constituents in the vicinity of monitoring wells MW-8 and MW-9. Following a minimum of three months (I quarter) the magnesium peroxide socks will be removed from each well. After the well has stabilized for two weeks groundwater samples will be collected from MW-5, MW-8 and MW-9 and analyzed for BTEX using EPA method 8020 and the fore-mentioned natural attenuation parameters. Based on the results of the groundwater monitoring event, additional nutrients and the magnesium socks may be placed into the well for an additional quarter. This process will be continued on a quarterly basis until BTEX concentrations in groundwater are below NMWQCC standards. El Paso Energy proposes to continue groundwater monitoring activities for monitoring wells MW-5, MW-8, and MW-9 for two additional quarters in order to document plume stability and insure BTEX concentrations have been reduced to levels below NMWQCC standards.

Please contact me at (713) 420-3306 with any questions or comments.

Sincerely,

Nancy Prince

Nancy K Prince, CGWP
Principal Environmental Scientist
Environmental Remediation Department

Attachments

Table 1
San Juan River Plant
Summary of VOC Groundwater Analytical Results for MW-5, MW-8, and MW-9

Date	Sample ID	benzene 8020 ug/l	toluene 8020 ug/l	ethylbenzene 8020 ug/l	xylenes 8020 ug/l	total BTEX 8020 ug/l
Jul-95	MW-5	ND(0.1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1.6)
	MW-8	**510**	0.8	46	**130**	686.8
	MW-9	**140**	0.6	25	**84**	249.6
Oct-95	MW-5	ND(0.1)	ND(1.0)	ND(0.5)	ND(0.5)	ND(1.6)
	MW-8	**488**	3.3	33.7	**95.8**	620.8
	MW-9	**124**	ND(2.5)	26	**128**	278
May-96	MW-5	ND(1.0)	ND(1.0)	ND(1.0)	ND(3.0)	ND(6.0)
	MW-8	**79.1**	ND(5.0)	ND(5.0)	35.4	114.5
	MW-9	**103**	ND(1.0)	16.7	31.9	151.6
Aug-96	MW-5	ND(1.0)	ND(1.0)	ND(1.0)	ND(3.0)	ND(6.0)
	MW-8	**427**	1.03	17.3	71.3	516.63
	MW-9	**75.2**	ND(1.0)	26.8	132	234
May-97	MW-5	ND(1.0)	ND(1.0)	ND(1.0)	ND(3.0)	ND(6.0)
	MW-8	**141**	ND(1.0)	3.78	35.1	38.88
	MW-9	**84.9**	1.03	8.2	7.95	102.08
Aug-97	MW-5	ND(1.0)	ND(1.0)	ND(1.0)	ND(3.0)	ND(6.0)
	MW-8	**307**	2.92	6.93	20.7	337.55
	MW-9	**106**	ND(1.0)	12	21.8	139.8
May-98	MW-5	ND(1.0)	ND(1.0)	ND(1.0)	NA	ND(3.0)
	MW-8	**449**	ND(1.0)	13.9	62.9	525.8
	MW-9	**89.5**	ND(1.0)	8.51	5.61	103.62
08/07/98	MW-5	ND(1.0)	ND(1.0)	ND(1.0)	ND(3.0)	ND(6.0)
	MW-8	**509**	ND(1.0)	7.05	42.9	558.95
	MW-8 DUP	**520**	ND(1.0)	7.27	44.4	572
	MW-9	**77**	ND(1.0)	7.08	5	89
11/04/98	MW-5	ND(1.0)	ND(1.0)	ND(1.0)	ND(3.0)	ND(6.0)
	MW-8	**408**	ND(1.0)	ND(1.0)	14.5	429
	MW-9	**89.8**	ND(1.0)	9.42	10.9	110
	MW-9 DUP	**94.3**	ND(1.0)	9.89	11.3	116
02/10/99	MW-5	ND(1.0)	ND(1.0)	ND(1.0)	ND(3.0)	ND(6.0)
	MW-8	**261**	ND(1.0)	ND(1.0)	6.1	267
	MW-9	**77**	ND(1.0)	8.1	6	92
	MW-9 DUP	**76.8**	ND(1.0)	8	5.7	91
5/17/99	MW-5	ND(1.0)	ND(1.0)	ND(1.0)	ND(3.0)	ND(6.0)
	MW-8	**205**	1.02	ND(1.0)	7.25	213
	MW-9	**78.3**	ND(1.0)	7.54	3.63	89
	MW-9 DUP	**75.5**	ND(1.0)	7.21	3.46	86
NMWQCC Standards		**10**	**75**	**75**	**62**	

NMWQCC = New Mexico Water Quality Control Commission
ug/l = micrograms per liter

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
2040 S. PACHECO
SANTA FE, NEW MEXICO 87505
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PS Form **3800**, April 1995

June 17, 1997

CERTIFIED MAIL
RETURN RECEIPT NO. P-410-431-182

Mr. David Bays
El Paso Field Services Company
P.O. Box 4990
Farmington, New Mexico 87499

RE: SOIL LANDFARM CLOSURE
SAN JUAN RIVER PLANT

Dear Mr. Bays:

The New Mexico Oil Conservation Division (OCD) has completed a review of El Paso Field Services (EPFS) April 4, 1997 "SAN JUAN RIVER PLANT LANDFARM" and November 13, 1996 "SAN JUAN RIVER PLANT LANDFARM" These documents contain the results of EPFS's sampling of the soils landfarm at the San Juan River Gas Plant and requests closure of the landfarm based upon the analytical results to date.

The above referenced closure request is approved.

Please be advised that OCD approval does not relieve EPFS of liability if remaining contaminants are found to pose a future threat to surface water, ground water, human health or the environment. In addition, OCD approval does not relieve EPFS of responsibility for compliance with any other federal, state or local laws and/or regulations.

If you have any questions, please call me at (505) 827-7154.

Sincerely,

Will C. Olson

William C. Olson
Hydrogeologist
Environmental Bureau

xc: Denny Foust, OCD Aztec District Office

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
2040 S. PACHECO
SANTA FE, NEW MEXICO 87505
(505) 827-7131

February 20, 1997

Mr. Davis Bays
El Paso Field Services Company
P.O. Box 4990
Farmington, New Mexico 87499

**RE: SOIL LANDFARM
SAN JUAN RIVER PLANT**

Dear Mr. Bays:

The New Mexico Oil Conservation Division (OCD) has reviewed El Paso Field Services (EPFS) November 13, 1996 "SAN JUAN RIVER PLANT LANDFARM" This document contains the results of EPFS's sampling of the soils landfarm at the San Juan River Gas Plant and requests closure of the landfarm based upon the analytical results to date.

The soil analytical results show that the total petroleum hydrocarbon (TPH) concentrations in the soils are less than the OCD's recommended remediation levels. However, the document does not contain either the benzene, toluene, ethylbenzene and xylene (BTEX) or volatile headspace measurements for the soils from each cell. In order for the OCD to complete a review of EPFS's closure request, please provide the OCD with this information.

If you have any questions, please call me at (505) 827-7154.

Sincerely,

William C. Olson
Hydrogeologist
Environmental Bureau

xc: Denny Foust, OCD Aztec District Office

97 JAN [illegible] 8 52

El Paso
Natural Gas Company

P.O. Box 1492
El Paso, TX 79978
Phone: 915-541-2600

January 10, 1997

Mr. William C. Olson
Environmental Bureau
New Mexico Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, New Mexico 87505

Subject: **Pond Closures**
EPNG San Juan River Plant

Dear Bill,

When the four ponds at San Juan River Plant were closed, the entire disturbed area was re-seeded with a BLM approved native grass mix. As we discussed on the telephone yesterday, January 9, 1997, because 1996 was a relatively dry year, the seed has not yet sprouted. EPNG proposes to wait one more growing season before additional seed is applied. The area will be checked periodically to make sure that present erosion control measures continue to be effective.

We are also completing a report to be sumitted soon summarizing the activities taken to investigate the groundwater over the past 10 years at the plant. This report will include the results of the investigations and recommendations for further action.

Please call me at 915-496-2839 if you have any questions. (Note that the downtown El Paso prefix has changed from 541 to 496.)

Sincerely,

Nancy Prince

Nancy K. Prince, CGWP
Principal Environmental Scientist
Environmental Affairs Department

cc: D. Foutz
WesGas Processors
R. A. Sumner
S. Miller
J. McNeely
M. Heimer

NEW MEXICO ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
2040 S. Pacheco
Santa Fe, New Mexico 87505

November 1, 1995

CERTIFIED MAIL
RETURN RECEIPT NO. Z-765-962-502

Ms. Nancy K. Prince
Environmental Affairs Department
El Paso Natural Gas Company
P.O. Box 1492
El Paso, Texas 79978

RE: POND CLOSURE PLAN
SAN JUAN RIVER PLANT

Dear Ms. Prince:

The New Mexico Oil Conservation Division (OCD) has completed a review of El Paso Natural Gas Company's (EPNG) October 10, 1995 " POND CLOSURES, EPNG SAN JUAN RIVER PLANT" and October 30, 1995 "POND CLOSURES EPNG SAN JUAN RIVER PLANT". These documents contain EPNG's work plan for closure of the three former non-contact waste water ponds and the former raw water pond located at the San Juan River Plant.

The above referenced closure plan is approved with the following conditions:

1. EPNG will submit a final report to the OCD upon completion of closure activities. The report will be submitted to the OCD Santa Fe Office with a copy provided to the OCD Aztec Office.

2. EPNG will notify the OCD at least one (1) week prior to all scheduled activities such that the OCD has the opportunity to witness the events.

3. EPNG will supply copies of the above referenced closure plans to the OCD Aztec Office.

OFFICE OF THE SECRETARY - P. O. BOX 6429 - SANTA FE, NM 87505-6429 - (505) 827-5950
ADMINISTRATIVE SERVICES DIVISION - P. O. BOX 6429 - SANTA FE, NM 87505-6429 - (505) 827-5925
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PARK AND RECREATION DIVISION - P. O. BOX 1147 - SANTA FE, NM 87504-1147 - (505) 827-7465

Please be advised that OCD approval does not relieve EPNG of liability should contamination exist which is outside the scope of work plan, or if the proposed closure plan fails to the adequately contain contamination at the site. In addition, OCD approval does not relieve EPNG of responsibility for compliance with any other federal, state or local laws and/or regulations.

If you have any questions, please call me at (505) 827-7154.

Sincerely,

Will C. Olson

William C. Olson
Hydrogeologist
Environmental Bureau

xc: Denny Foust, OCD Aztec District Office

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PS Form 3800, March 1993

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Natural Gas Company

P.O. Box 1492
El Paso, TX 79978
Phone: 915-541-2600

OIL CONSERVATION DIVISION
RECEIVED
'95 NO [illegible] AM 8 52

Fax received
on 10/30/95
Will Olson

October 30, 1995

Mr. William C. Olson
Environmental Bureau
New Mexico Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, New Mexico 87505

Subject: **Pond Closures EPNG San Juan River Plant**

Dear Bill,

This letter is in response to your request of October 23, 1995 for more information on the proposed closure of the former evaporation ponds at San Juan River Plant as described in my October 10, 1995 letter.

Three of the ponds were used for evaporating non-contact waste water at the plant. One pond was raw water storage for the plant. Previous soil and water samples indicated that the only consitutents of concern associated with these ponds were elevated chloride concentrations in the near surface soils. No petroleum hydrocarbons have been detected in soils within the ponds. This was confirmed by soil samples collected on June 26, 1995 (see attached table).

The proposed closure consists of grading the three waste water ponds to a single drainage in the approximate location of pit 3 and capping the area with six inches of locally available, low permeability clay soil. The cap will be mounded, machine compacted and re-seeded with native vegetation.

This cap should prevent infiltration of surface water and subsequent migration of salts in the groundwater. Monitoring wells installed at the downgradient edge of the facility boundary will be sampled annually to verify that no migration has occurred.

A report is being prepared which summarizes monitoring wells installation and sampling activities in June and July 1995. A copy will be forwarded to you as soon as it is available. Please call me at 915-541-2839 if you have any further questions.

Sincerely,

Nancy K. Prince

Nancy K. Prince, CGWP
Principal Environmental Scientist
Environmental Affairs Department

San Juan River Plant Evaporation Ponds Soil Samples 6/26/95

	Sample Point							
	Pond #1 Surface	Pond #1 Subsurface	Pond #2 Surface	Pond #2 Subsurface	Pond #3 Surface	Pond #3 Subsurface	Storage Pond Surface	Storage Pond Subsurface
Lab ID#	950732	950733	950734	950735	950736	950737	950738	950739
Date ofSample	26-Jun-95	26-Jun-95	26-Jun-95	26-Jun-95	26-Jun-95	26-Jun-95	26-Jun-95	26-Jun-95
TimeSampled (Hrs)	1335	1345	1410	1420	1445	1455	1515	1535
Calcium As Ca	318	25	351	143	413	293	662	584
Magnesium As Mg	458	9	58	55	110	32	108	82
Total Hardness As Ca	2680	99	1115	584	1484	863	2098	1796
Chloride As Cl	49352	985	24	140	20	28	45	24
Sulfate As SO4	23319	2120	37463	9546	47647	9767	1695	1478
Potassium As K	133	< 2	129	10	65	15	32	7
Sodium As Na	39855	1559	37862	5113	20746	5583	121	75
Conductivity (umhos)	75000	4000	32500	10100	26000	10500	25000	2100
TPH-EPA 418.1 (MG/	142	42	126	90	49	72	77	44
Percent Solids (%)	89.9	82.8	96.6	80.7	97.4	84.7	96.7	86

** All results expressed as ppm unless otherwise stated **

** All results by Standard Methods (AWWA) or EPA Method 300 **

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

State of New Mexico
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT
Santa Fe, New Mexico 87505

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal

Time 1615

Date 10/26/95

Originating Party	Other Parties
Nancy Prince - EPNG	Bill Olson - Envir. Bureau

Subject

San Juan River Plant pond closures

Discussion

OCD reviewed 10/10/95 work plan but no source area assessment data is included and no reasoning for selection of this remedial alternative

Source data collected this summer, Source ok except for salts

Told her concept is acceptable if no hydrocarbons in source and if downgradient GW monitoring is continued

Conclusions or Agreements

She will supply source data and reasoning ASAP

OCD needs minimum 2 week review

Distribution

file

Denny Foust - OCD Aztec

Signed Bill Olson

OIL CONSERVATION DIVISION
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'95 OC [illegible] AM 8 52

El Paso
Natural Gas Company

P.O. Box 1492
El Paso, TX 79978
Phone: 915-541-2600

October 10, 1995

Mr. William C. Olson
Environmental Bureau
New Mexico Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, New Mexico 87505

Subject: **Pond Closures**
EPNG San Juan River Plant

Dear Bill,

As we discussed on October 4, 1995, attached is a copy of the project description for closing four ponds at San Juan River Plant. This is a preliminary description written to be included in a bid package. The drawing referenced in the document has not been completed yet, but will be submitted under separate cover as soon as possible.

A location drawing has been enclosed to help you evaluate the plan for closing the ponds. The highest area of the site is to the east, and lowest to the west. The plan for closing the three former wastewater ponds calls for moving dirt from the dikes into the low areas, grading everything to a single drainage in the approximate location of pit 3. The entire site will be capped with locally available low permeability clay soil, and machine compacted.

The fourth pond was used only for raw water storage, and will be closed by simply breaching the dike to allow for drainage. Any additional material from grading ponds 1 - 3 will be placed into the lowest portion of the raw water pond.

Please call me at 915-541-2839 if you have any questions or need further information to evaluate our proposal. In order to expedite the completion of this project this fall we will present this bid package to our contractors as soon as it is ready. The contractor will be informed of any changes that you suggest prior to initiation of the construction.

Sincerely,

Nancy K Prince

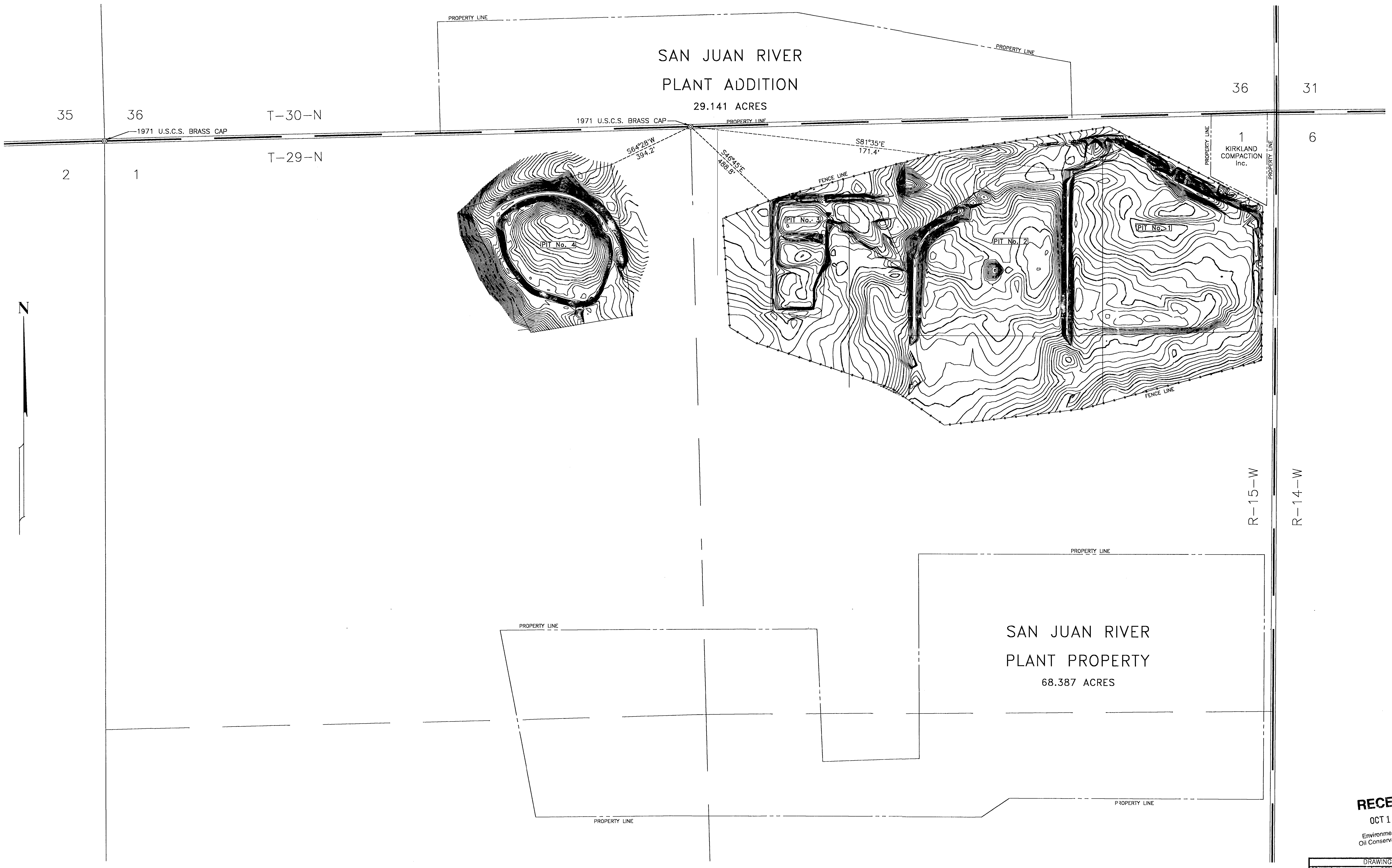
Nancy K. Prince, CGWP
Principal Environmental Scientist
Environmental Affairs Department

cc: T. D. Hutchins J. McNeely

PROJECT DESCRIPTION
CLOSE FOUR PITS AT SAN JUAN RIVER PLANT

Pits 1,2 and 3 are contiguous and will be closed as one project. The contractor will grade these three pits to conform to the cross sections shown on the drawings in the bid package. The contractor will compact the sub grade to 90 percent of the maximum density obtained in the modified proctor test for the soil in the pits. The contractor will place a one foot thick cap of soil as designated by the engineer. The cap for pits 1, 2 and 3 will require approximately 90,000 cubic yards and will be provided by the contractor on a per cubic yard basis. The cap will be compacted to 95 percent of the maximum density obtained in the modified proctor test for the soil in the cap. The compaction tests for the sub soil and the cap will be taken at the discretion of the project engineer or the project inspector. All soils test required will be the responsibility of El Paso Natural Gas. If there is any excess sub soil material from pits 1, 2 and 3 it will be disposed of in pit 4. The modified proctor test procedure is specified in ASTM D1557. The inplace compaction tests will conform to ASTM D1556, D2167 or D2922

The dike on the north side of pit 4 will be cut as shown on drawing 5202.1-30 in the bid package. The cut will be 100 feet at the bottom and the side slopes will be graded to 1 1/2 to 1. Any excess material from pits 1, 2 and 3 placed in pit 4 will be spread evenly over the bottom of the pit.



LOCATION PLAN

SCALE: 1" = 200'

RECEIVED
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Environmental Bureau
Oil Conservation Division

DRAWING LEGEND	
DRAWING No.	DESCRIPTION
5202.1-7	LOCATION PLAN
5202.1-8	SITE PLAN FOR PITS 1 & 2
5202.1-9 THRU 23	CROSS-SECTIONS FOR PTIS 1, 2 & 3
~~5202.1-24~~	~~SITE PLAN FOR PIT 4~~
5202.1-25 THRU 30	CROSS-SECTIONS FOR PIT 4

DWG. NO.	TITLE
5202.1-6	CONTOUR MAP, SAN JUAN RIVER PLANT
5202.1-5	SAN JUAN RIVER PLANT PARCEL FOR SALE
5202.1-4	SAN JUAN RIVER PLANT PROPERTY

REFERENCE DRAWINGS

NO.	DATE	BY	DESCRIPTION	W.O.	APP.

REVISIONS

PRT.	SEP.	DATE	TO	W.O.

PRINT RECORD

LEGEND

FM9 (Rev. 12/94)

ENG. RECORD		DATE
DRAFTING DESIGN	HMS	9-25-95
CAD DRAFTING	HMS	9-25-95
CHECKED		
PROJECT APPROVAL		
SURVEY DATE	6-21-95	
R/W NUMBER		
COMPUTER SAVE NAME	520217	

El Paso
NATURAL GAS COMPANY

ABANDONED WATER PITS No. 1 THRU 4
SAN JUAN RIVER PLANT
SECTION 1, T-29-N, R-15-W, N.M.P.M.
SAN JUAN COUNTY, NEW MEXICO

SCALE: AS SHOWN
W.O.: 49944
DWG. NO. 5202.1-7
REV.

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El Paso
Natural Gas Company

P.O. Box 1492
El Paso, TX 79978
Phone: 915-541-2600

June 20, 1995

Mr. William C. Olson
Hydrogeologist, Environmental Bureau
Energy, Mineral and Natural Resources Department
New Mexico Oil Conservation Division
P.O. Box 2088
Sante Fe, New Mexico 87504

RE: San Juan River Plant Groundwater and Soil Gas Study.

Dear Mr. Olson:

As we discussed last week, El Paso Natural Gas plans to begin the Groundwater and Soil Gas Survey at San Juan River Plant on Monday, June 26, 1995. It is anticipated that the soil gas survey will take three days, and the monitoring well project will take three weeks.

Two scope of work documents are enclosed: one for the monitoring well work and the other for the soil gas project. Also enclosed is a map depicting the monitoring wells which will be abandoned, replaced and/or upgraded and a typical monitoring well construction diagram.

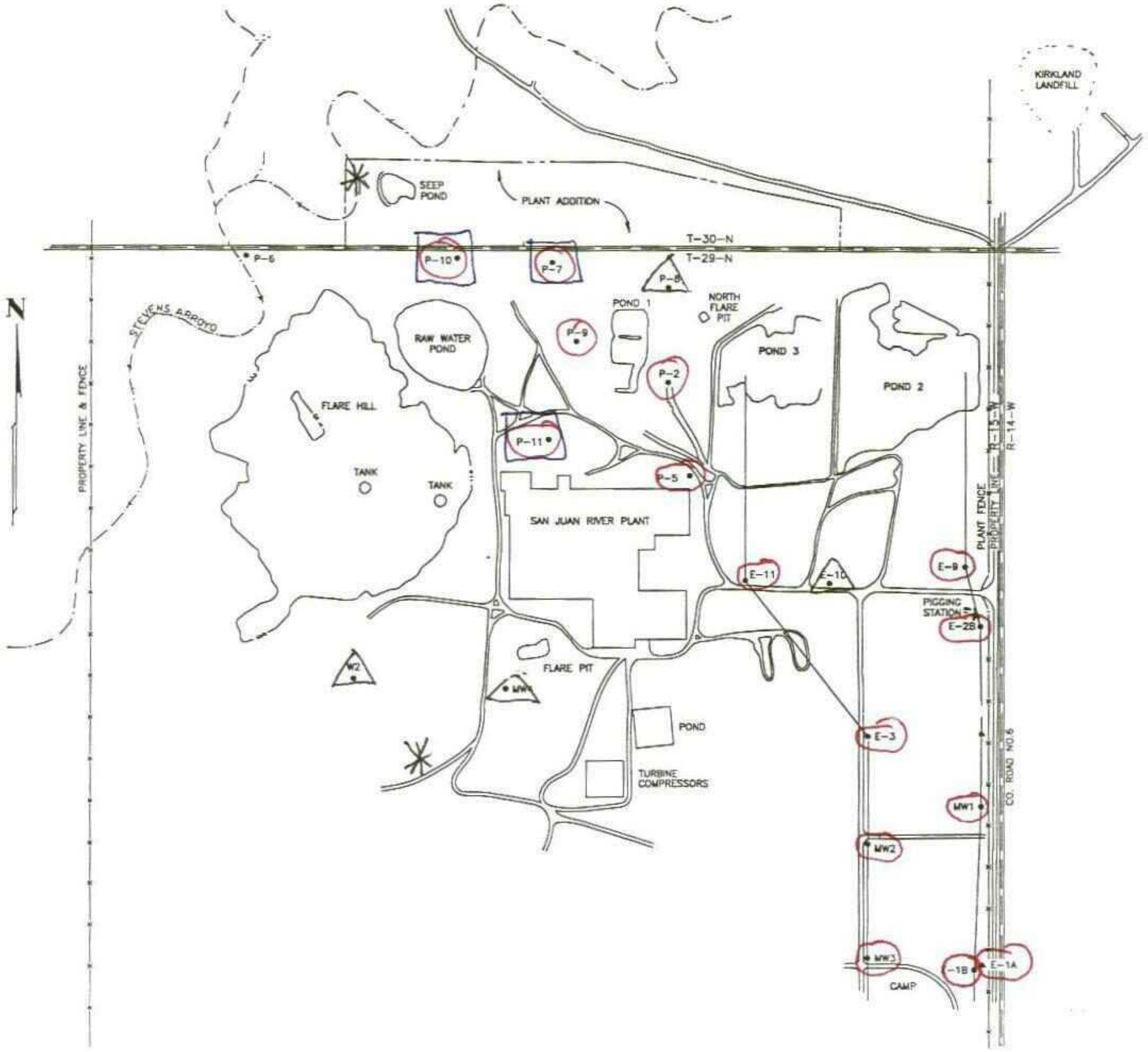
If you have any questions or comments please feel free to call me at (915) 541-2839.

Sincerely,

Nancy Prince

Nancy K. Prince, CGWP
Principal Environmental Scientist
Environmental Affairs Department

cc: J. Lambdin (w/o attach) T. D. Hutchins (w/o attach) K. Sedlak L.A. Allen
Shauna Doven (WesGas) Kent McEvers (WesGas) J. B. Ward (w/o attach)
file: 5202 gw



✱ New Monitoring Well Installation

○ Abandoned Well

▢ Abandoned and replaced well

△ Upgraded Wells

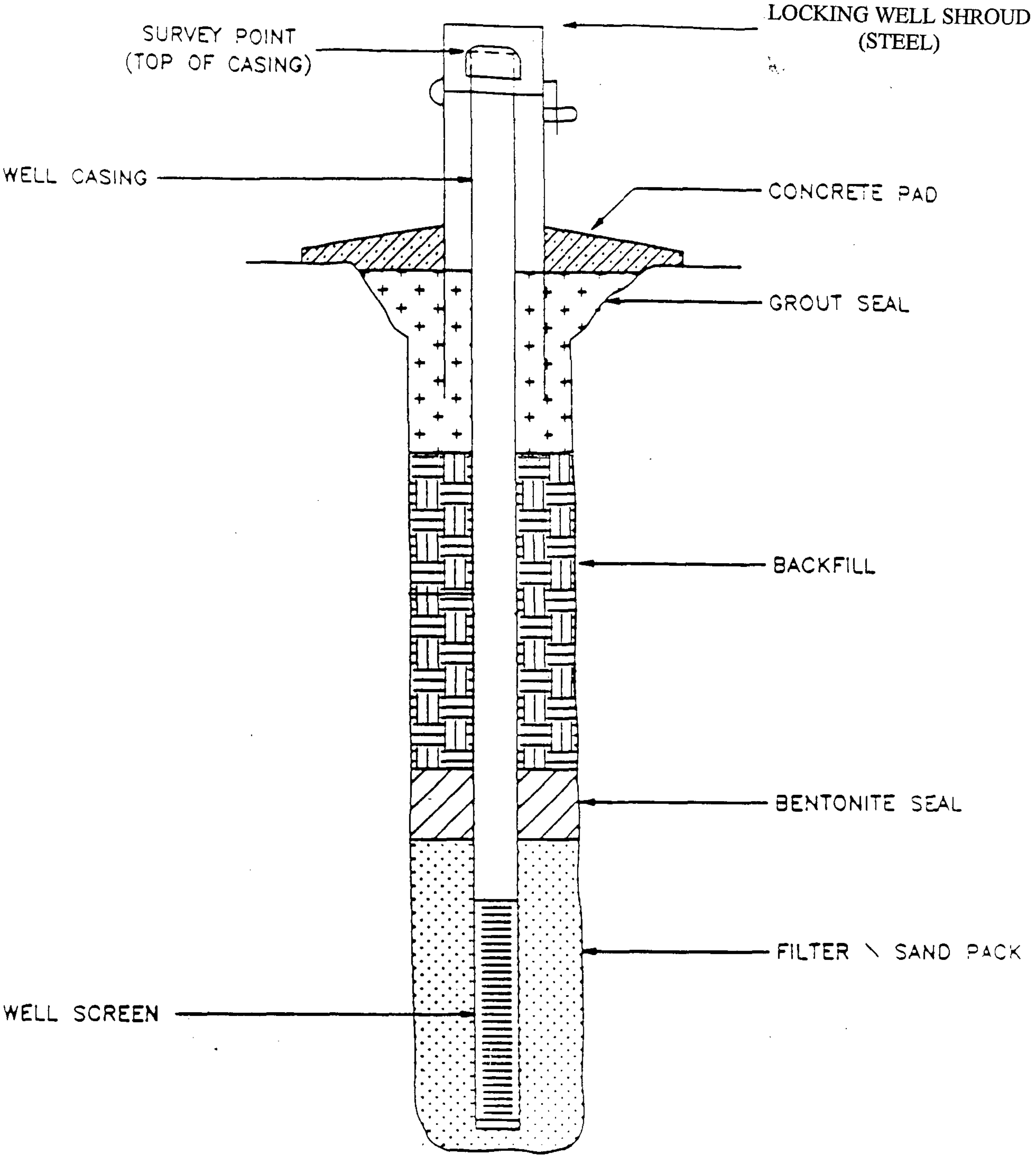
ENG. RECORD		DATE
DRAFTING DESIGN	K.S.	5/24/95
CAD DRAFTING	F.B.	5/24/95
CHECKED		
PROJECT APPROVAL		
SURVEY DATE		
R/W NUMBER		
COMPUTER SAVE NAME	2SJ1M25	

El Paso
NATURAL GAS COMPANY

EL PASO NATURAL GAS COMPANY
SAN JUAN RIVER PLANT

SCALE: 1"=400'
W.O.
DWG. NO. 2SJ-1-M25
REV.

FWB (Rev. 12/94)



GENERALIZED MONITORING WELL SCHEMATIC

(Not To Scale)

WELL ABANDONMENT, INSTALLATION AND UPGRADE

AT THE SAN JUAN RIVER PLANT

SCOPE OF WORK

JUNE 1995

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  4.3 Monitoring Well Development 2
  4.4 Upgrading of Existing Wells 2
  4.5 Well Abandonment 2
  4.6 Reports 2

5.0 RESPONSIBILITIES OF THE CONTRACTOR 2

6.0 RESPONSIBILITY OF EPNG 3

7.0 RELATIONSHIP BETWEEN EPNG AND THE CONTRACTOR 3

8.0 SITE INSPECTIONS 3

9.0 CONTRACTING ISSUES 3

10.0 SCHEDULE 3

11.0 SAFETY AND HEALTH 3

12.0 CONTACTS 3

13.0 INVOICING 4

14.0 SITE LOCATION 4

15.0 ATTACHMENTS 4

SCOPE OF WORK

MONITORING WELL/PIEZOMETER
ABANDONMENT AND REPLACEMENT
SAN JUAN RIVER PLANT
FARMINGTON, NEW MEXICO
EL PASO NATURAL GAS COMPANY

1.0 BACKGROUND

The San Juan River Plant previously owned by El Paso Natural Gas is located in Section 1, T-29-N, R-15-W, San Juan County, New Mexico. Nineteen monitoring wells/piezometers (wells) were installed from 1985 through 1987. These were installed to aid in characterization of potential contamination migration and to support installation of a landfarm.

2.0 INTRODUCTION

El Paso Natural Gas Company (EPNG) wishes to abandon selected wells which are no longer required or are unusable. Three wells will be replaced with new wells will be installed at selected locations. Remaining wells will be upgraded with protective surface casings and concrete pads.

3.0 ENVIRONMENTAL REGULATIONS/GUIDELINES

The drilling contractor shall be licensed to work in New Mexico. All personnel working on-site shall have 40 hour OSHA 1910.120 training and submit certification to EPNG with the bid proposal. The contractor must meet all of the general conditions specified on the back of the EPNG company contract form.

The contractor shall familiarize himself with any such specifications, drawings, and permits as furnished by EPNG and shall comply with all requirements and stipulations with that respect. The contractor shall receive written approval from EPNG before using subcontractors for any portion of the work.

The contractor shall adhere to the New Mexico Environment Department (NMED) Groundwater Section, Monitoring Well Construction and Abandonment Guidelines.

4.0 SCOPE OF WORK

Fifteen wells will be abandoned, three of the wells will be replaced. The following wells will be abandoned; E1B, E1A, E2B, E3, E9, E11, MW-1, MW-2, MW-3, P-2, P-9, P-5, P-7, P-10, and P-11. Wells P-7, P-10, and P-11 will be replaced with four-inch PVC monitoring wells. The remaining four wells, P-8, W-2, E10 and MW-4, will be upgraded with steel protective casings and concrete pads. Monitoring well E-10 will also be upgraded and utilized as a background well. Two additional four-inch monitoring wells will be installed at selected locations (See Map). Changes to this scope of work may be proposed based on the outcome of the soil gas survey being conducted under a separate contract amendment. At the close of this phase of the project it is anticipated that 8 wells will be active at the site.

4.1 Monitoring Well Installation

Monitoring wells will be constructed of 4-inch flush threaded schedule 40 PVC. The screen will consist of 0.010-inch factory slotted PVC. The screen length will be 15 feet. A fifteen foot screen will be placed 10 feet below the water table with five feet of screen above the water table. All wells will be completed with a steel protective brightly painted surface riser, a two by two foot square four-inch thick concrete pad, and a locking cap on the inner casing. The maximum depth anticipated for the monitoring wells is approximately 65 feet in depth. All monitoring wells will have a permanent I.D. marker such as a brass survey plate placed into the cement.

4.2 Soil Sampling

During the installation of six monitoring wells, soil samples will be collected at five foot intervals. Soil samples will be screened for volatile organics with a PID or equivalent instrument. One sample per boring displaying a large salt content will be analyzed for saline parameters. If any of the samples collected from a well indicates >50 ppm VOCs, the sample with the highest reading will be collected for BTEX analysis. Lithologic descriptions of the soil samples shall be logged at the time of drilling.

Soil cuttings and/or water generated during the project will be containerized in appropriate 55-gallon DOT approved new drums. The decontamination water will be taken to the EPNG Kutz separator for disposal.

4.3 Monitoring Well Development

The new monitoring wells will be developed by pumping a minimum of three well volumes or until conductivity, pH, turbidity and temperature have stabilized within 5% for three consecutive readings, on field calibrated equipment. Monitoring wells will not be developed sooner than 24 hours after installation and no later than one week after installation. All parameters and volumes of water produced during development will be documented. All development waters will be transported to the EPNG Kutz separator.

4.4 Upgrading of Existing Wells

The three wells which will not be abandoned will have concrete pads and protective risers installed. These pads and risers will be similar to the pads and risers for the new monitoring wells.

4.5 Well Abandonment

Wells will be abandoned per the New Mexico Environment Department (NMED) Groundwater Section, Monitoring Well Construction and Abandonment Guidelines. These guidelines state that "monitoring wells no longer in use shall be plugged in such a manner as to preclude migration of the surface runoff or groundwater along the length of the well. Where possible, this shall be accomplished by removing the well casing and pumping expanding cement from the bottom to the top of the well using a tremie pipe. If the casing can not be removed, the casing shall be ripped or perforated along it's entire length if possible, and grouted. Filling with bentonite pellets from the bottom to the top is an acceptable alternative to pressure grouting" (NMED1992).

4.6 Reports

The contractor will submit weekly project status reports to the project engineer every Thursday. The weekly progress status report will include but not be limited to a) status, b) schedule, c) budget status, d) problems encountered.

A report summarizing field activities including QA/QC and problems encountered shall be prepared. Include all lithologic logs, completion diagrams, and abandonment records.

5.0 RESPONSIBILITIES OF THE CONTRACTOR

5.1 The contractor will be responsible for providing any required protection and security or all materials and equipment at the job site. **Note:** EPNG will assume no liability for losses of materials and equipment, furnished by the contractor, after delivery to the job site.

5.2 The contractor shall provide a field geologist/engineer superintendent, supervisor or foreman whom shall supervise the work through to completion. The contractor shall provide necessary sanitation facilities for their employees.

5.3 The contractor shall provide a written work schedule showing the starting date, progress, completion dates, and an applicable NMED guidelines for the project, prior to the start of work.

6.0 RESPONSIBILITY OF EPNG

6.1 EPNG will designate access and egress locations for the contractor's trucks and equipment. EPNG will determine those water supply locations for supplying the steam cleaner. EPNG will flag or otherwise mark underground utilities in the areas targeted for exploration. EPNG will provide an on-site inspector. EPNG will also sample the monitoring wells and survey the well locations and altitude. No other materials, equipment, or services for this work will be provided.

7.0 RELATIONSHIP BETWEEN EPNG AND THE CONTRACTOR

EPNG will have personnel familiar with the site and location of the existing wells. EPNG and the Contractor will agree on all well locations. Any modifications to this scope of work proposed by EPNG or the Contractor that will effect the project cost, will be approved in writing by both parties prior to performing the additional work. All drawings, records, and reports generated by the contractor for this project will be the property of EPNG.

8.0 SITE INSPECTIONS

8.1 A final inspection shall be made by a representative of EPNG and a representative of the contractor. If the inspection indicates that work has been completed according to the specifications and work descriptions, the contract will be accepted.

8.2 Those items or conditions which are not approved will be corrected at the contractors expense.

9.0 CONTRACTING ISSUES

The Contractor shall follow all specifications set out in the current contract. The Contractor shall respond to this SOW with an estimate of time and material costs required to complete the tasks outlined in Section 4.0. Any proposed changes in the SOW should be forwarded with the cost estimate.

10.0 SCHEDULE

Work will be initiated as soon as possible after approval by EPNG. Contractor shall supply EPNG with a work and completion schedule prior to beginning work.

11.0 SAFETY AND HEALTH

11.1 Any contractor's employee not complying with EPNG's safety requirements shall be removed from the job site.

11.2 The contractor is responsible for supplying a health and safety plan. The contractor will provide personnel with adequate safety equipment to include but not limited by hard-hat, safety shoes, eye protection, ignition proof outerwear, and other items the contractor deems appropriate to insure safe working conditions. The contractor will also be obligated to supply gloves to prevent cross-contamination during well installation.

11.3 A safety meeting will be held prior to the start of the project work, and a tailgate safety meeting will be held prior to the start of each days activities.

12.0 CONTACTS

EPNG contacts for this project are: Ms. Nancy Prince Project Hydrogeologist (915) 541-2839 and Mr. John Lambdin will be the project Quality Assurance/Quality Control Manager.

13.0 INVOICING

The contractor will provide EPNG with invoices for this project, at intervals not to exceed 30 days. All invoices must include backup documentation for all listed costs. This should include, but not be limited to the following:

- all labor/hour reports
- computer work station reports
- travel: airline tickets, rental car, and lodging
- overnight mail
- equipment (e.g., coolers, buckets) and misc. supplies
- rental equipment
- BEI equipment and supplies report
- film developing and video tapes
- copies of all subcontractor invoices
- parking
- long distance telephone calls
- general office overhead costs

14.0 SITE LOCATION

The site is located approximately 10 miles from Farmington, New Mexico on Route 64. (attached map)

15.0 ATTACHMENTS

Piezometer and well boring logs, cross-sections and well location maps will be provided under a separate cover.

cc:
VIA E-Mail
T.D. Hutchins
N.K. Prince
G. Garibay
J. Lambdin
R.E. Molder
Hard Copy
File 5202 Groundwater
Chron

VERTICAL AND HORIZONTAL ASSESSMENT
OF SOIL VAPOR CONTAMINATION
AT THREE LOCATIONS
AT THE
SAN JUAN RIVER PLANT

SCOPE OF WORK

JUNE 1995

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VERTICAL AND HORIZONTAL ASSESSMENT
OF SOIL VAPOR CONTAMINATION
AT THREE LOCATIONS
AT THE
SAN JUAN RIVER PLANT

1.0 BACKGROUND

The San Juan River Plant previously owned by El Paso Natural Gas is located in Section 1, T-29-N, R-15-W, San Juan County, New Mexico. During the course of monitoring well sampling three wells consistently contained elevated levels of BTEX. EPNG would like to investigate these locations further to determine the source of these hydrocarbons.

2.0 INTRODUCTION

EPNG would like to conduct a preliminary investigation to determine the horizontal extent of the hydrocarbon contamination in the soil at the above referenced locations. Additional groundwater investigations may be conducted during the monitoring well abandonments and replacement projects.

3.0 ENVIRONMENTAL REGULATIONS AND GUIDELINES

The contractor and all subcontractors shall have proper license to work in New Mexico. All boring abandonments shall meet the requirements of the State of New Mexico and EPNG policy. All personnel working on the site shall have 40 hour 29CFR 1910.120 training and submit certification to EPNG with the bid proposal. The contractor must meet all of the general conditions specified on the back of the EPNG company contract form.

The contractor shall familiarize himself with any such specifications, drawings, and permits as furnished by EPNG and shall comply with all requirements and stipulations with that respect. The contractor shall receive written approval from EPNG before using subcontractors for any portion of the work.

4.0 SCOPE OF WORK

The specifications of each task to be conducted under this scope of work are defined in Section 4.1 through 4.5.

4.1 The RECON^R van will be utilized for horizontal determination of soil vapor contamination at the site. Although. the exact number of sample locations will be based on field conditions i.e. underground utilities, buildings and accessibility, EPNG estimates that at a minimum four sample locations will be required for each well location. This exact number will be determined in the field depending on site conditions and analytical results as determined by consensus of EPNG and the contractor.

These locations will be placed on all four sides of existing monitoring wells P-7, P-10 and P-11. The locations will be placed on 25 foot centers. If the horizontal contamination is not determined from these sample locations it will be necessary to conduct additional sampling locations. Based upon the depth to groundwater approximately three soil gas depths will be collected per location. These depths are 3 feet below ground surface (bgs), 6 feet bgs, and 9 feet bgs. The maximum depth is anticipated to be 9 feet bgs, at P-7 and P-10 but deeper borings may be required especially at P-11. One water sample will be collected and analyzed per sampling location, if groundwater is encountered.

4.2 The soil gas and water samples will be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) per USEPA Method 8020 and USEPA Method 3810. Groundwater samples collected will be analyzed for BTEX per USEPA Method 6220. In addition, all analytical work should be performed in accordance with SW 846 criteria. All soil gas locations will be placed on a sketch map for each site. The results of the soil gas and groundwater analyses will be used to determine future activities. All soil gas borings will be filled with granulated bentonite and hydrated immediately after removal of the probe.

4.3 The contractor will also collect QA samples these samples will include an equipment blank, a system blank and a duplicate sample. The equipment blank will be collected prior to each days sampling activities. The system blank will be collected at the beginning of each survey day and every ten samples, or at least once daily. Duplicate samples will be collected and analyzed every ten samples, or at least once a day.

4.4 Provide EPNG with a brief summary report detailing field procedures and QA/QC. Include all boring logs, sketch maps of soil gas and water sampling locations and summary analytical data, and tables with soil gas and water analytical data.

4.5 The contractor shall furnish to EPNG a report summarizing the activities conducted under this scope of work..

5.0 RESPONSIBILITY OF THE CONTRACTOR

5.1 The contractor will be responsible for providing any required protection and security of all materials and equipment at the job site. **Note:** EPNG will assume no liability for losses of materials and equipment, furnished by the contractor, after delivery to the job site.

5.2 The contractor shall provide a geologist/engineer to supervise the work through to completion. EPNG expects the contractor to provide technical expertise/advice with regard to sampling points and site evaluations. The contractor shall provide necessary sanitation facilities for their employees that they deem necessary.

5.3 The contractor shall provide a written work schedule showing the starting date, progress, completion dates, prior to the start of work.

5.4 The contractor will notify the appropriate underground utility protection service with the proper information and with a minimum of 48 hour advance notice.

5.5 Decontamination water can be stored on-site for 48 hours from completion of the project. The decontamination water will then be transported to EPNG's Kutz separator for disposal. The contractor shall supply all necessary equipment and manpower to move and empty the drums of decontamination water. The disposal of personnel protection equipment will be the contractors responsibility.

6.0 RESPONSIBILITY OF EPNG

EPNG will provide an on-site inspector. EPNG will survey the soil gas and well locations and altitude. No other materials, equipment, or services for this work will be provided.

7.0 RELATIONSHIP BETWEEN EPNG AND THE CONTRACTOR

EPNG will have personnel familiar with the site and location of the existing wells. EPNG and the contractor will agree on all soil gas locations. Any modifications to this scope of work proposed by EPNG or the Contractor that will effect the project cost, will be approved in writing by both parties prior to performing the additional work. All drawings, records, and reports generated by the contractor for this project will be the property of EPNG

8.0 SITE INSPECTIONS

8.1 A final inspection shall be made by a representative of EPNG and a representative of the contractor. If the inspection indicates that work has been completed according to the specifications and work descriptions, the contract will be accepted.

8.2 Those items or conditions which are not approved will be corrected at the contractors expense.

9.0 CONTRACTING ISSUES

The contractor shall follow all specifications set out in the current contract. The contractor shall respond to this SOW with an estimate of the time and material costs required to complete the tasks outlined in Section 4. EPNG would like the contractor to base their pricing on a 12 hour day and provide a daily cost and estimated number of days to accomplish the tasks. Any proposed changes in the SOW should be forwarded with the cost estimate.

10.0 SCHEDULE

Work shall be initiated as soon as possible after approval by EPNG. Philip shall supply EPNG with a work and completion schedule prior to beginning work.

11.0 HEALTH AND SAFETY

The contractor will provide personnel with adequate safety equipment to include hard-hat, safety shoes, safety eyewear, ignition-proof outerwear, and other items the contractor deems appropriate to insure safe working conditions. The contractor will also be obligated to provide gloves to prevent cross-contamination during sampling.

12.0 CONTACTS

EPNG contacts for this project are: Ms. Nancy Prince, Project Hydrogeologist, Mr. John Lambdin will be the Project Quality Assurance/Quality Control Manager

13.0 INVOICING

The contractor will provide EPNG with invoices for this project, at intervals not to exceed 30 days. All invoices must include backup documentation for all listed costs. This should include, but not be limited to the following:

- all labor/hour reports
- computer work station reports
- travel: airline tickets, rental car, lodging
- overnight mail
- equipment (e.g., ice checks, buckets) and misc. supplies
- rental equipment
- Philip equipment and supplies report
- film developing, video tapes
- copies of all subcontractor invoices
- parking
- long distance telephone calls
- general office overhead costs

14.0 SITE LOCATION

See attached map. Logs for existing wells and analytical data will be provided under separate cover.

KMS/kms/EAD

file:c:\winword\wrkscope\sjrpsow.doc

6/1/15 OCD/EPNG Meeting 10:30 am

attendees - Bill Olson OCD
- Tom Hutchins - EPNG
- Gerry Garibay - "
- Nancy Prince - "

Jal #4 (see handouts)

discussed MW locations
install 3 MW's instead of nested set proposed

oil well recently installed adjacent to ACW-11, big jump in Cl^- in recent sampling

remediation system not yet operational

San Juan Plant

Discuss MW's

Want to recontour old pit site
Should be OK but,
Need to characterize soils in pit bottom prior to closure

They will submit plan

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

June 29, 1993

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-242-349

Ms. Sandra D. Miller
Sr. Environmental Scientist
El Paso Natural Gas Company
P.O. Box 4990
Farmington, New Mexico 87499

RE: FLARE PIT CLOSURE REPORT
EPNG SAN JUAN RIVER PLANT
SAN JUAN COUNTY, NEW MEXICO

Dear Ms. Miller:

The New Mexico Oil Conservation Division (OCD) has completed a review of the El Paso Natural Gas Company (EPNG) February 8, 1993 "EL PASO NATURAL GAS CO. SAN JUAN RIVER PLANT FLARE PIT CLOSURE REPORT" and April 6, 1993 "FLARE PIT CLOSURE REPORT - INQUIRY, SAN JUAN RIVER PLANT". These documents describe the recent north flare pit and south flare pit remediation activities at the San Juan River Plant.

The closures of the flare pits referenced in the above reports have been completed to the standards in effect at the time of closure and **are hereby approved** with the following conditions:

1. Ground water from monitor well MW-4 located downgradient of the south flare pit and monitor well P-8 downgradient of the north flare pit will be sampled on an annual basis for benzene, toluene, ethylbenzene, xylene and polycyclic aromatic hydrocarbons (PAH) using appropriate EPA laboratory methods.
2. A report containing the results of the annual sampling will be submitted to OCD by December 31 of each year.
3. OCD will be notified at least two weeks in advance of sampling activities such that OCD may have the opportunity to witness the sampling and/or split samples.

Please be advised that OCD approval does not relieve EPNG of liability should remaining contaminants be found to be migrating from the closed flare pit units. In addition, OCD approval does not relieve EPNG of responsibility for compliance with any other state, federal or local laws and/or regulations.

If you have any questions please contact me at (505) 827-5885.

Sincerely,

Will Olson

William C. Olson
Hydrogeologist
Environmental Bureau

xc : OCD Aztec District Office

El Paso
Natural Gas Company

P. O. BOX 4990
FARMINGTON, NEW MEXICO 87499

OIL CONSERVATION DIVISION
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April 6, 1993

Mr. William C. Olson
New Mexico Oil Conservation Division
P.O. Box 2088
State Land Office Building
Santa Fe, NM 87504

Re: Flare Pit Closure Report - Inquiry
San Juan River Plant

Dear Mr. Olson:

This letter is in response to your inquiry dated March 17, 1993 regarding the EPNG San Juan River Plant Flare Pit Closure Report. The following information is provided for your information:

1. Section 1e - Exploratory Trenching - The samples taken from the exploratory trenches were taken from the layer of soil that had the most discoloration. The sample depths for trenches 2-7 are as follows:

   Trench 2 - 21'
   Trench 3 - 21'
   Trench 4 - 14'
   Trench 5 - 13'
   Trench 6 - 14'
   Trench 7 - 21'

2. We have been unable to determine a logical explanation for the high levels of TPH found in sample number N22562. The sample was secured in an area south east of the south flare pit, near a well traveled dirt road. Another background sample was taken the same day as noted in section 1f. This sample (#N22536), showed no measurable TPH concentrations.

3. It appears in the diagram in Section 1f that a factor "x" is being subtracted out of results for the east and south walls. The "x" does not represent a factor. The "x" represents "xylene" concentrations that were measured in those two samples. There were no other measurable BTEX concentrations detected in any of the other samples indicated in the diagram. This is also shown in the verification summary also located in Section 1f.

4. Sample number N22486 represents a background soil sample taken from the middle of the landfarm area, prior to spreading of soil, and approximately 2' below the surface.

The results as noted in Section 3b indicate a total chromium content of 29.6 mg/kg and a total lead content of 7 mg/kg. EPNG is interested in knowing the criteria that NMOCD has used to determine that these levels are "elevated". EPNG's in-house hydrogeologist has provided references from published data which indicate that these concentrations are within normal ranges for background levels. These references are as follows:

****

Source: Linsay, W.L., 1979. Chemical Equilibria in Soils, John Wiley and Sons. From Table 6.46 in EPA 1983, Hazardous Waste Land Treatment, SW-874 (28a).

	Common Range	Average
Chromium	1-1,000 mg/kg	100 mg/kg
Lead	2-200 mg/kg	10 mg/kg

****

Source: Shacklette, H.T., and Boeragen, J.G.; Element Concentrations in Soils and Other Surficial Materials of the Coterminous United States. U.S. Geol. Surv. Professional Paper 1270. 105pp

"Normal Ranges of Elemental Concentrations in Soils of the Western United States"

	Mean	Normal Range Mean +/- 1 s.d.
Chromium	41 mg/kg	19-90 mg/kg
Lead	17 mg/kg	9-31 mg/kg

Means and Standard Deviations are geometric to account for log-normal distributions.

****

If you have any questions or comments regarding the above information, please feel free to contact me at 599-2141.

Sincerely,
El Paso Natural Gas Co.

Sandra D. Miller

Sandra D. Miller
Sr. Environmental Scientist

cc: Denny Foust, NMOCD
W.D. Hall, EPNG

1912

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

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SANTA FE, NEW MEXICO 87504
(505) 827-5800

March 17, 1993

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-242-328

Ms. Sandra D. Miller
Sr. Environmental Scientist
El Paso Natural Gas Company
P.O. Box 4990
Farmington, New Mexico 87499

RE: FLARE PIT CLOSURE REPORT
EPNG SAN JUAN RIVER PLANT
SAN JUAN COUNTY, NEW MEXICO

Dear Ms. Miller:

The New Mexico Oil Conservation Division (OCD) is in the process of reviewing the El Paso Natural Gas Company (EPNG) February 8, 1993 "EL PASO NATURAL GAS CO. SAN JUAN RIVER PLANT FLARE PIT CLOSURE REPORT". The report documents the recent north flare pit and south flare pit remediation activities at the San Juan River Plant.

The OCD has the following questions regarding the above referenced report:

1. Section 1e refers to sample results for exploratory trenching at the south flare pit to determine the extent of contamination outside the excavated area. It is not clear what soil sample intervals are represented for trenches 2-7. Please clarify what soil interval these samples represent.

2. The sample results table in Section 1f shows background sample N22562 containing high levels of TPH. Where were the background samples taken and why are the TPH levels so high?

3. The diagram in Section 1f showing the location of the verification samples and their corresponding TPH analytical result has a factor "x" being subtracted from the TPH results of the east wall and south wall results. What does factor "x" represent?

4. The background soil sample results for the landfarm in Section 3b show the native soils containing elevated levels of chromium and lead. What is the source of these metals?

The OCD looks forward to your response. If you have any questions please contact me at (505) 827-5885.

Sincerely,

Will C. Olson

William C. Olson
Hydrogeologist
Environmental Bureau

xc : Denny Foust, OCD Aztec District Office

El Paso
Natural Gas Company

P. O. BOX 4990
FARMINGTON, NEW MEXICO 87499

OIL CONSERVATION DIVISION
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February 8, 1993

Mr. William Olson
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504

Dear Mr. Olson;

During the last quarter of 1992, El Paso Natural Gas Co. performed the remediation and closure of the north and south flare pits located at San Juan River Plant in Kirtland, NM. The onsite work activities were completed in late November.

Enclosed for your review is the final closure report for the work done on these two flare pits. As a paper saving measure, all analytical information is provided in the form of tabulated summaries. The actual laboratory reports are available upon request.

If you have questions or comments regarding this project, you may reach me a (505)599-2141.

Yours Truly,

El Paso Natural Gas Co.

Sandra D. Miller

Sandra D. Miller
Sr. Environmental Scientist

cc: Mr. Denny Foust, NMOCD, Aztec
Mr. W.D. Hall, El Paso Natural Gas Co.

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

October 19, 1992

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-242-303

Ms. Sandra D. Miller
Sr. Environmental Scientist
El Paso Natural Gas Company
P.O. Box 4990
Farmington, New Mexico 87499

RE: FLARE PIT CLOSURE PLAN MODIFICATION
EPNG SAN JUAN RIVER PLANT
SAN JUAN COUNTY, NEW MEXICO

Dear Ms. Miller:

The New Mexico Oil Conservation Division (OCD) has completed a review of the El Paso Natural Gas Company (EPNG) October 12, 1992 correspondence requesting permission to modify EPNG's September 16, 1992 "FLARE PIT CLOSURES AT SAN JUAN RIVER PLANT" which was approved by OCD on September 28, 1992. The modification seeks to remediate petroleum contaminated soils onsite using landfarming techniques instead of removing the soils for offsite disposal.

The above referenced request to modify the previously approved flare pit closure plan is hereby approved with the following conditions:

1. Only contaminated soils generated during the closure of the San Juan River Plant flare pits will be landfarmed onsite.

2. The location of the landfarm, identified by you in our October 16, 1992 conversation, will be the 15 acre area west and south of the south flare pit.

3. The landfarm will be operated according to the attached operating conditions.

Please be advised that OCD approval does not relieve EPNG of liability should the landfarm operation result in actual pollution of surface waters or the environment actionable under other laws and/or regulations. In addition, OCD approval does not relieve you of liability for compliance with any other laws and/or regulations.

If you have any questions please contact me at (505) 827-5885.

Sincerely,

William C. Olson
Hydrogeologist
Environmental Bureau

Attachment

xc : Denny Foust, OCD Aztec District Office

ATTACHMENT TO OCD PERMIT APPROVAL
EL PASO NATURAL GAS COMPANY
SOILS LANDFARM
SAN JUAN RIVER GAS PROCESSING PLANT
(October 19, 1992)

LANDFARM OPERATION

1. The landfarm area will be bermed to prevent runon or runoff to or from the landfarm area.

2. All contaminated soils will be spread and disked within 72 hours of receipt.

3. Soils will be spread on the surface in six inch lifts or less.

4. Soils will be disked a minimum of one time every two weeks (biweekly) to enhance biodegradation of contaminants.

5. Successive lifts of contaminated soils will not be spread until a laboratory measurement of Total Petroleum Hydrocarbons (TPH) in the previous lift is less than 100 parts per million (ppm), and the sum of all aromatic hydrocarbons (BTEX) is less than 50 ppm, and the benzene is less than 10 ppm. Comprehensive records of the laboratory analyses and the sampling locations will be maintained by EPNG. Authorization from the OCD will be obtained prior to application of successive lifts.

6. Moisture will be added as necessary to control blowing dust and to enhance bioremediation. There will be no ponding, pooling or run-off of water allowed. Any ponding of precipitation will be removed within seventy-two (72) hours of discovery.

7. Enhanced bio-remediation through the application of microbes (bugs) will only be permitted after prior approval from the OCD. Request for application of microbes must include the location of the area designated for the bio-remediation program, composition of additives, and the method, amount and frequency of application.

8. No free liquids or soils with free liquids will be accepted at the site.

9. Comprehensive records of all material disposed of at the facility will be maintained by EPNG. The records for each load will include: 1) the origin; 2) analysis for hazardous constituents, if required; 3) transporter; and 4) exact cell location.

TREATMENT ZONE MONITORING

1. One (1) background soil sample will be taken from the center portion of the landfarm two (2) feet below the native ground surface. The sample will be analyzed for total petroleum hydrocarbons (TPH), general chemistry, and heavy metals using approved EPA methods.

2. A treatment zone not to exceed two (2) feet beneath the land farm will be monitored. A minimum of one random soil sample will be taken from each individual cell, with no cell being larger than five (5) acres, six (6) months after the first contaminated soils are received in the cell and then quarterly thereafter. The sample will be taken at two to three (2-3) feet below the native ground surface.

3. The soil samples will be analyzed for TPH, volatile aromatic organics (BTEX) quarterly and general chemistry and heavy metals annually using approved EPA methods.

4. After obtaining the soil samples the boreholes will be filled with an impermeable material such as bentonite cement.

REPORTING

1. Analytical results from the treatment zone monitoring will be submitted to the OCD Santa Fe Office within thirty (30) days of receipt from the laboratory.

2. The OCD will be notified of any leak, break, spill, blow out, or fire or any other circumstance that could constitute a hazard or contamination in accordance with OCD Rule 116.

CLOSURE

When the facility is to be closed no new material will be accepted. Existing soils will be remediated until they meet the OCD standards in effect at the time of closure. The area will then be reseeded with natural grasses and allowed to return to its natural state. Closure will be pursuant to all OCD requirements in effect at the time of closure.

RECEIVED

OCT 13 1992

OIL CONSERVATION DIV.
SANTA FE

El Paso
Natural Gas Company

P. O. BOX 4990
FARMINGTON, NEW MEXICO 87499

October 12, 1992

Mr. William Olson
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504

Dear Mr. Olson;

El Paso Natural Gas Co. is currently remediating and closing the two flare pits located at our former San Juan River Plant in Kirtland, NM. Our activities to date have been limited to the south flare pit. We have excavated approximately 10,000 cubic yards of soil since we started the project. We anticipate that the final amount from the south flare pit will be greater than 12,000 cubic yards.

We have identified a distinct clay layer at a depth of approximately 12-15 feet below the original pit bottom. We have also performed some exploratory trenching around the perimeter of the pit. It appears that the contamination at the pit berm is approximately 15 feet thick. As you follow the trench out, the thickness of the contaminated layer drops drastically and quickly. EPNG proposes to remove the contaminated plume to the point where the ratio of overburden vs. contaminated layer is approximately 5:1.

We have performed preliminary sampling and analyses at various phases of the project. A summary of the analytical results along with descriptions of the sample locations is enclosed. The results have indicated the following:

1. The TPH results in the clay layer are well below 100 ppm.
2. The soil that is being excavated from the pit is showing levels of approximately 7000ppm TPH.
3. The excavated soil is very black in color. The blackness is due to the presence of iron sulfide.
4. There is little or no BTEX levels in the excavated soils.
5. The TPH readings indicate hydrocarbons in the range of C10-C36.

Denny Foust of NMOCD's Aztec office has inspected the remediation operations on two different occasions. He has commented that the contaminated soil is not as rich as he anticipated. He also stated that pending your review, the option of landfarming the soil on site **may** be feasible. As a result of the conversations that I have had with Mr. Foust, I am submitting a proposal that EPNG landfarm the soil on site. I feel that the following items are in support of my request.

1. The TPH levels in the clay layer are well below 100ppm. This indicates that the clay is acting as a barrier to any migration. (The clay layer is also evident in the trenches that we excavated.)
2. The monitor well located 100 feet downgradient of the pit has tested negative for BTEX. This supports item #1 above.
3. The contaminated soil has little or no BTEX content. (Well below NMOCD guideline limits.)
4. The TPH levels of the contaminated soil are relatively low.
5. As related to item #2 above, the groundwater has not been impacted by the soil when it was in the pit. Placing it on the surface would be less of a risk.
6. The TPH analyses show hydrocarbons in the range of C10-C36. These are heavy ends and are less likely to migrate.
7. EPNG has adequate property in the immediate vicinity to accommodate a landfarming operation.

As with similar landfarming applications that you have approved for EPNG, the San Juan River site would be operated according to NMOCD guidelines. This would include berming, disking, and periodic sampling. EPNG would also be willing to explore the use of additives to speed up the degradation of the soil. EPNG acknowledges that this would apply to the flare pit project only. Contaminated soils from locations outside of San Juan River Plant would not be brought in.

Landfarming on site would result in significant cost savings to EPNG. If you have any questions or comments, you can reach me at 505/599-2141. I look forward to your response regarding this matter.

Sincerely,

El Paso Natural Gas

Sandra D. Miller

Sandra D. Miller
Sr. Env. Scientist

cc: Mr. Denny Foust, NMOCD, Aztec Office
Mr. W.D. Hall, EPNG

SAN JUAN RIVER PLANT
SOUTH FLARE PIT CLOSURE
SAMPLE DESCRIPTIONS

Sample Number N22296 - This soil sample was taken on the west side of the pit in the area just below the contaminated layer.

Sample Number N22297 - This soil sample was taken on the west side of the pit in the black soil layer, just above the clay layer.

Sample Number N22298 - This soil sample was taken on the east side of the pit in the black soil layer. The clay layer on east side of the pit was deeper than on the west side.

Sample Numbers N22299 to N22301 - These samples were taken from a trench that was dug perpendicular to the west side of the pit, extending outside the pit perimeter.

Sample Numbers N22306 to N22308 - These samples were composited from the excavated soil stockpile.

Sample Numbers N22310 to N22315 - These samples were composited from the excavated soil stock pile.

Sample Number N22316 - This sample was taken at the point at which the clay layer began in the pit bottom.

FIELD SERVICES LABORATORY ANALYTICAL RESULTS
SAN JUAN RIVER PLANT – SOUTH FLARE PIT
Summary to Date: October 9, 1992

Sample Number	Sample Location	Sample Description	Time	Date (MM/DD/YY)	IR TPH Mod. 418.1 (MG/KG)	C10–C36 TPH Mod. 8015 (MG/KG)	EPA Met. 8020 (BTEX) (MG/KG)				TCLP Metals
							B	T	E	X	
N22296	West Pit @ 10 Foot, Gray Soil	Gray: Sand–Clay	833	09/29/92	28.5	12	<.025	<.025	<.025	<.025	Pass
N22297	West Pit @ 10 Foot, Black Soil	Black: Fine Grain	837	09/29/92	171	27	<.025	<.025	<.025	<.025	Pass
N22298	East Pit @ 10 Foot	Black: Rocky	843	09/29/92	6453	2000	<.025	<.025	<.025	0.029	Pass
N22299	20 Foot outside W. Berm, Above Clay	Black: Sandy	853	09/29/92	979	369	NR	NR	NR	NR	Pass
N22300	20 Foot outside W. Berm, Below Clay	Brown: Clay	900	09/29/92	75.3	7	<.025	<.025	<.025	0.041	Pass
N22301	20 Foot outside W. Berm, Top of Clay	Grey: Clay	902	09/29/92	52.8	7	<.025	<.025	<.025	<.025	Pass
N22302	Background Soil	Brown: Sandy	913	09/29/92	177	10	<.025	<.025	<.025	<.025	Pass
N22306	Main Soil Pile, North – Bottom	Black/Gray Sand	1530	09/30/92	>10,000	6400	<.025	0.1	0.049	0.5	NR
N22307	Main Soil Pile, Middle– Bottom	Black/Gray Sand	1535	09/30/92	>10,000	6954	0.028	0.13	0.058	0.49	NR
N22308	Main Soil Pile, South – Bottom	Black/Gray Sand	1540	09/30/92	>10,000	7352	<.025	0.049	0.032	0.26	NR
N22310	North Pile side 1 – Core	Gray, Fine Sand	1048	10/02/92	>5,000	3400	<.025	<.025	<.025	0.03	NR
N22311	North Pile side 2 – Core	Gray, Fine Sand	1100	10/02/92	>10,000	5600	<.025	<.025	0.026	0.2	NR
N22312	Middle Pile side 1 – Core	Gray, Fine Sand	1113	10/02/92	>10,000	6500	<.025	<.025	<.025	0.1	NR
N22313	Middle Pile side 2 – Core	Gray, Fine Sand	1125	10/02/92	>10,000	8200	<.025	0.028	0.091	0.59	NR
N22314	South Pile side 1 – Core	Gray, Fine Sand	1142	10/02/92	>10,000	7000	<.025	<.025	0.027	0.15	NR
N22315	South Pile side 2 – Core	Gray, Fine Sand	1152	10/02/92	>10,000	7100	<.025	0.027	0.079	0.46	NR
N22316	Bottom of Pit – 10 Foot, South Wall	Gray, Clay	1212	10/02/92	280	<5	<.025	<.025	<.025	<.025	NR
N22317	Background Soil	Brown: Sandy	1220	10/02/92	118	79	<.025	<.025	<.025	<.025	NR

NOTES:
NR = Not Run, Sample Problems: Not enough, too wet, etc.

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

September 28, 1992

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-242-299

Ms. Sandra D. Miller
Sr. Environmental Scientist
El Paso Natural Gas Company
P.O. Box 4990
Farmington, New Mexico 87499

RE: FLARE PIT CLOSURE
EPNG SAN JUAN RIVER PLANT
SAN JUAN COUNTY, NEW MEXICO

Dear Ms. Miller:

The New Mexico Oil Conservation Division (OCD) has completed a review of the El Paso Natural Gas Company (EPNG) September 16, 1992 "FLARE PIT CLOSURES AT SAN JUAN RIVER PLANT". This plan proposes a method for closure of the north and south flare pits at the San Juan River Plant.

The OCD approves of the above referenced closure plan with the following conditions:

1. The assessment to determine the lateral and vertical extent of contamination related to the flare pits will be performed pursuant to the enclosed OCD "GUIDELINES FOR SURFACE IMPOUNDMENT CLOSURE".
2. The excavations will be inspected by OCD prior to backfilling.
3. A report containing the results of the closure will be submitted to OCD within 60 days of completion of the closure activities.

The OCD understands that closure work at the site will begin on September 28, 1992. Please contact Denny Foust at the OCD Aztec Office prior to commencement of work so that the OCD may have the opportunity to have a representative present.

Please be advised that OCD approval does not limit you to the work proposed should the closure activities fail to remediate petroleum contaminated soils with contaminant levels in excess of OCD actionable levels or if ground water should be impacted by contaminants migrating from the flare pits. In addition, OCD approval does not relieve you of liability under any other laws and/or regulations. If you have any questions please contact me at (505) 827-5885.

Sincerely,

William C. Olson
Hydrogeologist
Environmental Bureau

Enclosure

xc : Denny Foust, OCD Aztec District Office

RECEIVED

SEP 17 1992

OIL CONSERVATION DIV.
SANTA FE

El Paso
Natural Gas Company

P. O. BOX 4990
FARMINGTON, NEW MEXICO 87499

September 16, 1992

Mr. William C. Olson
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504

Re: Flare Pit Closures at San Juan River Plant

Dear Mr. Olson,

El Paso Natural Gas Co. is developing final plans to close the north and south flare pits at San Juan River Plant per discharge plan requirements. We are seeking NMOCD approval to close the pits in the following manner.

As stated in our November 1, 1991 correspondence to NMOCD, visually contaminated soil is to be removed from each of the flare pits to a depth of approximately 10 feet. An assessment will be made at that time to determine the need for further action.

For the south flare pit, rocks shall be separated from the contaminated soil. This will be performed by running the soil through a "shaker" type apparatus on site. Removal of the rocks will help us reduce costs by reducing the volume going to the landfarm. All rocks that are separated out will be allowed to weather, will be placed back into the excavation, and covered with backfill. This procedure will also be performed for the north flare pit, should the situation warrant.

Monitor well #MW-4, W-2, and piezometer P-8 were sampled on July 8, 1992 and analyzed for BTEX. All results were below detectable limits for those constituents. For your convenience, I have enclosed a copy of a drawing which indicates the position of the sampling points with regard to the flare pits. I have also enclosed copies of the analytical data.

The south flare pit will be backfilled with native soil taken from EPNG property near our Angel Peak facility. The north flare pit will be backfilled with dike material taken from the nearby evaporation pond. In order to prevent surface ponding, both pits will be contoured appropriately to divert runoff.

All contaminated soil will be transported to Envirotech's landfarm facility located on highway 44. Remediation and transportation services will be provided by Burlington Environmental, Inc..

EPNG wishes to begin remediation activities as soon as possible. El Paso would like to schedule work to begin the week of 9/21/92, pending your approval.

If you have any questions or comments regarding this matter, you can reach me at (505)599-2141. Your prompt attention would be greatly appreciated.

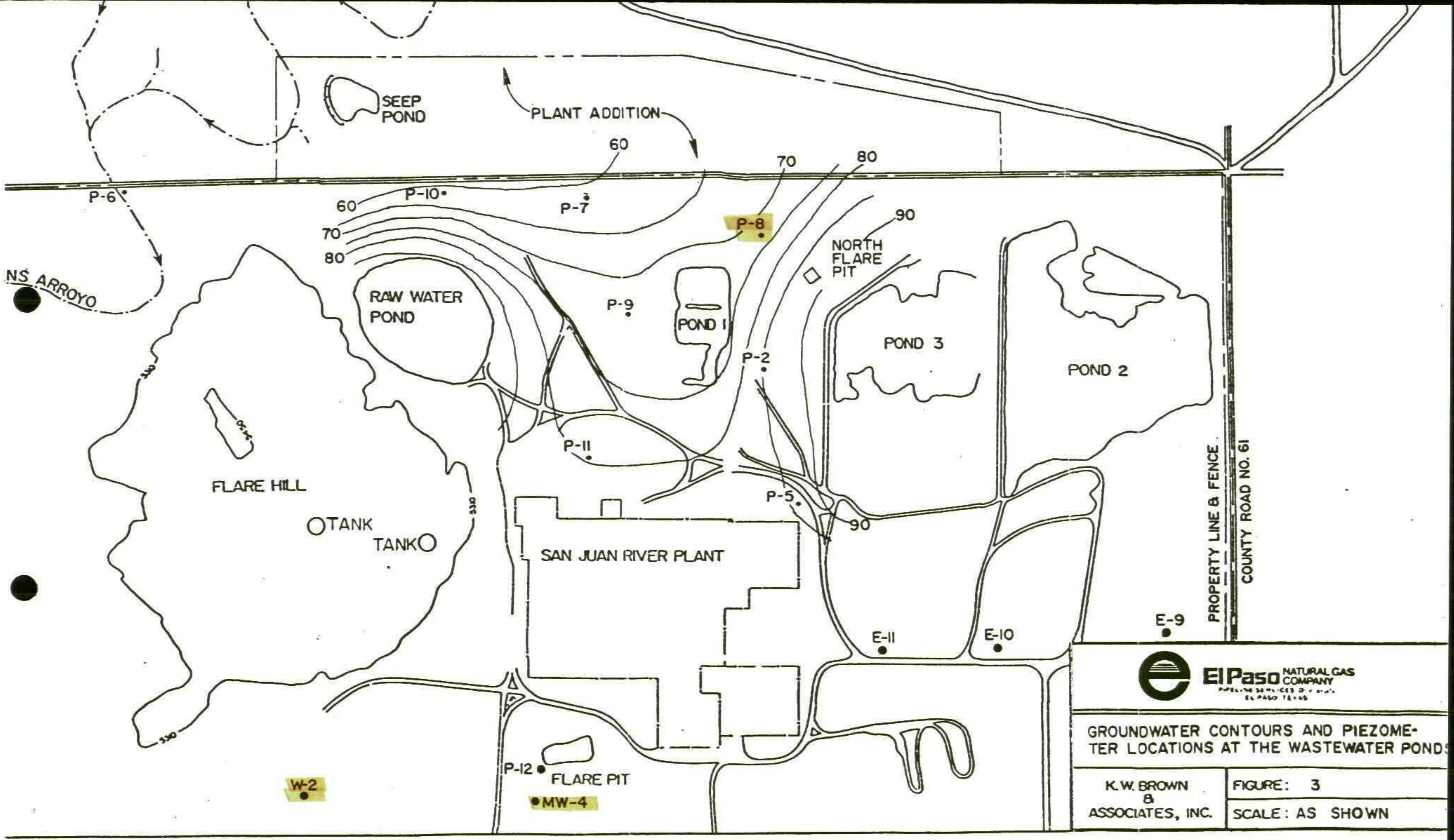
Sincerely,

El Paso Natural Gas Co.

Sandra D. Miller

Sandra D. Miller
Sr. Environmental Scientist

cc: W.D. Hall, El Paso Natural Gas Co.
Denny Foust, NMOCD



El Paso NATURAL GAS COMPANY

GROUNDWATER CONTOURS AND PIEZOMETER LOCATIONS AT THE WASTEWATER PONDS

K.W. BROWN & ASSOCIATES, INC.

FIGURE: 3

SCALE: AS SHOWN

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Burlington Environmental
Seattle Facility

Date: July 17, 1992

Report On: Analysis of Water

Lab No.: 25610
Page 1 of 4

IDENTIFICATION:

Samples received on 07-13-92
Project: EPNG

ANALYSIS:

SJRP MW-4

Lab No. 25610-1

Client ID: N21613 40285-1

BTEX by Method 8020
Date Extracted: 7-15-92
Date Analyzed: 7-15-92

Benzene, mg/l	< 0.001
Toluene, mg/l	< 0.001
Ethyl Benzene, mg/l	< 0.001
Xylenes, mg/l	< 0.001
SURROGATE RECOVERY, %	
Trifluorotoluene	134

SJRP P-9

Lab No. 25610-2

Client ID: N21614 40285-2

BTEX by Method 8020
Date Extracted: 7-15-92
Date Analyzed: 7-15-92

Benzene, mg/l	< 0.001
Toluene, mg/l	< 0.001
Ethyl Benzene, mg/l	< 0.001
Xylenes, mg/l	< 0.001
SURROGATE RECOVERY, %	
Trifluorotoluene	79

Continued . . .

Burlington Environmental
Project: EPNG
Page 2 of 4
Lab No. 25610
July 17, 1992

SJRP P-8

Lab No. 25610-3 Client ID: N21615 40285-3

BTEX by Method 8020
Date Extracted: 7-15-92
Date Analyzed: 7-15-92

Benzene, mg/l	< 0.001
Toluene, mg/l	< 0.001
Ethyl Benzene, mg/l	< 0.001
Xylenes, mg/l	< 0.001
SURROGATE RECOVERY, %	
Trifluorotoluene	150

SJRP W-2

Lab No. 25610-4 Client ID: N21616 40285-4

BTEX by Method 8020
Date Extracted: 7-15-92
Date Analyzed: 7-15-92

Benzene, mg/l	< 0.001
Toluene, mg/l	< 0.001
Ethyl Benzene, mg/l	< 0.001
Xylenes, mg/l	< 0.001
SURROGATE RECOVERY, %	
Trifluorotoluene	92

Continued . . .

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

QUALITY CONTROL REPORT

BTEX by EPA SW-846 Method 8020

Client:	Burlington Environmental Seattle Office
Lab No:	25610qc
Matrix:	Water
Units:	mg/l
Date:	July 17, 1992

DUPLICATES

Dup No. 25610-5

Parameter	Sample (S)	Duplicate (D)	RPD	FLAGS
Benzene	5.6	5.5	1.8	
Toluene	0.25	0.23	8.3	
Ethyl Benzene	0.24	0.24	0.0	
Xylenes	1.2	1.2	0.0	
<u>SURROGATE RECOVERY,%</u>				
Trifluorotoluene	142	141		

RPD = Relative Percent Difference
= [(S - D) / ((S + D) / 2] x 100

Acceptable
8/17/92

METHOD BLANK

Blank No. 92071603

Parameter	Blank Value
Benzene	< 0.001
Toluene	< 0.001
Ethyl Benzene	< 0.001
Xylenes	< 0.001
<u>SURROGATE RECOVERY,%</u>	
Trifluorotoluene	86

BURLINGTON ENVIRONMENTAL, INC.
Chempro Division
2203 Airport Way South, Suite 400
Seattle, WA 98134

206-223-0500 • FAX: 223-7791

Chain of Custody/ Laboratory Analysis Request

DATE 7-10-92 PAGE 1 OF 1

PROJECT EPNG #

CLIENT INFO CONTACT K. Krefs

CHEMPRO DIVISION/GENERATOR NAME Burlington Enviro Lab

TELEPHONE # 223.0500

SAMPLERS NAME John Lambdin PHONE #

SAMPLERS SIGNATURE

	SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	PCB's 608/8080	TPH (circle method) 418.1 or 8015	BETX (circle method) 8240 or [✓ 8020]	F-LISTED SOLVENTS 8240	TCLP F-LISTED SOLVENTS 1311/8240	TCLP METALS D004-11	METALS (TOTAL) As. Ba. Cd. Cr. Cu. Pb. Ni. Hg. Ag. Se. Tl. Sb. Zn	TCLP ORGANICS (specify methods) • VOA's 8240 • BNA's 8270 • Pesticides 8080 • Herbicides 8150	DISCHARGE TESTING	OTHER (Specify)						NUMBER OF CONTAINERS	RECEIVED IN GOOD CONDITION?
1.	N21613	7-8-92	1210	40285-1	water					X													2	
2.	N21614	7-8-92	1350	40285-2	water					X													2	
3.	N21615	7-8-92	1455	40285-3	water					X													2	
4.	N21616	7-8-92	1505	40285-4	water					X													2	
5.	N21617	7-8-92	1530	40285-5	water					X													2	
6.	N21618	7-8-92	1615	40285-6	water					X													2	
7.	N21619	7-8-92	1655	40285-7	water					X													2	
8.																								

Relinquished By T. Claus
Signature T. Claus
Printed Name BEI
Firm 7-13-92
Date/Time

Relinquished By
Signature
Printed Name PALMQUIST
Firm SAS
Date/Time 7-13 10:30A

Relinquished By
Signature
Printed Name
Firm
Date/Time

Received By
Signature
Printed Name PALMQUIST
Firm SAS
Date/Time 7-13 10:30A

Received By Mary Curtiss
Signature M Curtiss
Printed Name SAS
Firm 7/13/92 10:30
Date/Time

Received By
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS

DISTRIBUTION WHITE return to originator; YELLOW lab; PINK retained by originator

(LAB-200 Rev. 10/90)

SAMPLE KEY

SAMPLE NUMBER: F00-0350 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL #5
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:40 SAMPLE DATE: 12/21/2000
BY: Chuck Padilla

SAMPLE KEY

SAMPLE NUMBER: F00-0351 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL #8
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:10 SAMPLE DATE: 12/21/2000
BY: Chuck Padilla

SAMPLE KEY

SAMPLE NUMBER: F00-0352 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL #9
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:00 SAMPLE DATE: 12/21/2000
BY: Chuck Padilla

NEL LABORATORIES
Reno • Las Vegas • Boise
Phoenix • Sacramento

Las Vegas Division
4208 Arcata Way, Suite A • Las Vegas, NV 89030
(702) 657-1010 • Fax: (702) 657-1577
1-888-368-3282

CLIENT: El Paso Natural Gas Company
8645 Railroad Drive
El Paso, TX 79904
ATTN: Darrell Campbell

PROJECT NAME: San Juan River Plant
NEL ORDER ID: P0012070
PROJECT NUMBER: NA

Attached are the analytical results for samples in support of the above referenced project.

Samples submitted for this project were not sampled by NEL Laboratories. Samples were received by NEL in good condition, under chain of custody on 12/22/00.

Should you have any questions or comments, please feel free to contact our Client Services department at (602) 437-0099.

Stan Van Wagenen
Laboratory Manager

1/11/01
Date

CERTIFICATIONS:

	Reno	Las Vegas	S. California
Arizona	AZ0520	AZ0518	AZ0605
California	1707	2002	2264
US Army Corps of Engineers	Certified	Certified	

	Reno	Las Vegas	S. California
Idaho	Certified	Certified	
Montana	Certified	Certified	
Nevada	NV033	NV052	CA084
L.A.C.S.D.			10228

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant
PROJECT #: NA

CLIENT ID: **F00-0350**
DATE SAMPLED: 12/21/00
NEL SAMPLE ID: P0012070-01

TEST: **Metals**
MATRIX: Aqueous

ANALYST: FRM - Reno Division

PARAMETER	RESULT mg/L	REPORTING LIMIT	D. F.	METHOD	DIGESTED	ANALYZED
Iron	0.59	0.1 mg/L	1	EPA 6010	12/28/00	12/29/00
Manganese	0.026	0.005 mg/L	1	EPA 6010	12/28/00	12/29/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0351**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	12/21/00
PROJECT #:	NA	NEL SAMPLE ID:	P0012070-02

TEST: **Metals**
MATRIX: Aqueous
ANALYST: FRM - Reno Division

PARAMETER	**RESULT mg/L**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**DIGESTED**	**ANALYZED**
Iron	0.16	0.1 mg/L	1	EPA 6010	12/28/00	12/29/00
Manganese	0.011	0.005 mg/L	1	EPA 6010	12/28/00	12/29/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0352**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	12/21/00
PROJECT #:	NA	NEL SAMPLE ID:	P0012070-03
TEST:	**Metals**		
MATRIX:	Aqueous	ANALYST:	FRM - Reno Division

PARAMETER	**RESULT mg/L**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**DIGESTED**	**ANALYZED**
Iron	0.34	0.1 mg/L	1	EPA 6010	12/28/00	12/29/00
Manganese	0.11	0.005 mg/L	1	EPA 6010	12/28/00	12/29/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	P1207012-BLK

TEST: **Metals**

PARAMETER	**RESULT mg/L**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**DIGESTED**	**ANALYZED**
Iron	ND	0.1 mg/L	1	EPA 6010	12/28/00	12/29/00
Manganese	ND	0.005 mg/L	1	EPA 6010	12/28/00	12/29/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0350**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	12/21/00
PROJECT #:	NA	NEL SAMPLE ID:	P0012070-01

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	RESULT	R. L.	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	1.1	0.3	1	SM 4500-NH3 B/E	mg/L-N	12/31/00
Nitrate, as N	ND	1.	10	EPA 300.0	mg/L-N	12/23/00
Nitrite, as N	ND	1.	10	EPA 300.0	mg/L-N	12/23/00
Orthophosphate, as P	ND	0.01	1	SM 4500-P E	mg/L-P	12/22/00
Sulfate	14000	500.	5000	EPA 300.0	mg/L	1/2/01
TKN (Total Kjeldahl Nitrogen)	0.98	0.3	1	SM 4500-N C/NH3 E	mg/L-N	1/4/01

R.L. - Reporting Limi
D.F. - Dilution Factor
ND - Not Detected

NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0351**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	12/21/00
PROJECT #:	NA	NEL SAMPLE ID:	P0012070-02

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	RESULT	R. L.	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	1.8	0.3	1	SM 4500-NH3 B/E	mg/L-N	12/31/00
Nitrate, as N	ND	1.	10	EPA 300.0	mg/L-N	12/23/00
Nitrite, as N	ND	1.	10	EPA 300.0	mg/L-N	12/23/00
Orthophosphate, as P	ND	0.01	1	SM 4500-P E	mg/L-P	12/22/00
Sulfate	12000	1000.	10000	EPA 300.0	mg/L	1/2/01
TKN (Total Kjeldahl Nitrogen)	2.0	0.3	1	SM 4500-N C/NH3 E	mg/L-N	1/4/01

R.L. - Reporting Limi
D.F. - Dilution Factor
ND - Not Detected
This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant
PROJECT #: NA

CLIENT ID: **F00-0352**
DATE SAMPLED: 12/21/00
NEL SAMPLE ID: P0012070-03

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	RESULT	R. L.	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	0.34	0.3	1	SM 4500-NH3 B/E	mg/L-N	12/31/00
Nitrate, as N	ND	1.	10	EPA 300.0	mg/L-N	12/23/00
Nitrite, as N	ND	1.	10	EPA 300.0	mg/L-N	12/23/00
Orthophosphate, as P	0.029	0.01	1	SM 4500-P E	mg/L-P	12/22/00
Sulfate	3800	1000.	10000	EPA 300.0	mg/L	1/2/01
TKN (Total Kjeldahl Nitrogen)	0.42	0.3	1	SM 4500-N C/NH3 E	mg/L-N	1/4/01

R.L. - Reporting Limi
D.F. - Dilution Factor
ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	001222OP-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Orthophosphate, as P	ND	0.01	1	SM 4500-P E	mg/L-P	12/22/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	001223IC-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Nitrate, as N	ND	0.1	1	EPA 300.0	mg/L-N	12/23/00
Nitrite, as N	ND	0.1	1	EPA 300.0	mg/L-N	12/23/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	001231NH3-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	ND	0.3	1	SM 4500-NH3 B/E	mg/L	12/31/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	010102IC-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Sulfate	ND	0.1	1	EPA 300.0	mg/L	1/2/01

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant
PROJECT #: NA

CLIENT ID: **Method Blank**
DATE SAMPLED: NA
NEL SAMPLE ID: 010104TKN-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
TKN (Total Kjeldahl Nitrogen)	ND	0.3	1	SM 4500-N C/NH3 E	mg/L	1/4/01

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0350**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	12/21/00
PROJECT #:	NA	NEL SAMPLE ID:	P0012070-01

TEST: **BTEX by EPA SW846 Method 8021B, Dec. 1996**

METHOD:	EPA 8021B	ANALYST:	JQT - Las Vegas Division
MATRIX:	Aqueous	EXTRACTED:	NA
DILUTION:	1	ANALYZED:	1/3/01

PARAMETER	**Result**	**Reporting Limit**
Benzene	2.2 µg/L	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	9.1 µg/L	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	96	69 - 120

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0351**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	12/21/00
PROJECT #:	NA	NEL SAMPLE ID:	P0012070-02

TEST:	**BTEX by EPA SW846 Method 8021B, Dec. 1996**		
METHOD:	EPA 8021B	ANALYST:	JQT - Las Vegas Division
MATRIX:	Aqueous	EXTRACTED:	NA
DILUTION:	1	ANALYZED:	1/3/01

PARAMETER	**Result**	**Reporting Limit**
Benzene	ND	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	6.7 µg/L	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	92	69 - 120

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0352**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	12/21/00
PROJECT #:	NA	NEL SAMPLE ID:	P0012070-03

TEST:	**BTEX by EPA SW846 Method 8021B, Dec. 1996**		
METHOD:	EPA 8021B	ANALYST:	JQT - Las Vegas Division
MATRIX:	Aqueous	EXTRACTED:	NA
DILUTION:	1	ANALYZED:	1/3/01

PARAMETER	**Result**	**Reporting Limit**
Benzene	86 µg/L	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	7.1 µg/L	2. µg/L
Total Xylenes	12 µg/L	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	94	69 - 120

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Trip Blank**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	12/21/00
PROJECT #:	NA	NEL SAMPLE ID:	P0012070-04

TEST: **BTEX by EPA SW846 Method 8021B, Dec. 1996**

METHOD:	EPA 8021B	ANALYST:	JQT - Las Vegas Division
MATRIX:	Aqueous	EXTRACTED:	NA
DILUTION:	1	ANALYZED:	1/3/01

PARAMETER	**Result**	**Reporting Limit**
Benzene	ND	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	7.00 µg/L	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	96	69 - 120

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	San Juan River Plant	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	010103BX_A-BLK

TEST:	**BTEX by EPA SW846 Method 8021B, Dec. 1996**		
METHOD:	EPA 8021B	ANALYST:	JQT - Las Vegas Division
MATRIX:	Aqueous	EXTRACTED:	NA
		ANALYZED:	1/3/01

PARAMETER	**Result**	**Reporting Limit**
Benzene	ND	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	105	69 - 120

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	NEL Sample ID	Spike Amount	Spike Result	Percent Recovery	Acceptable Range	RPD
Orthophosphate, as P	001222OP-LCS	0.25	0.251	100	94 - 100	
Orthophosphate, as P	P0012070-01-MS	0.25	0.241	96	90 - 104	
Orthophosphate, as P	P0012070-01-MSD	0.25	0.246	98	90 - 104	2.1

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	NEL Sample ID	Spike Amount	Spike Result	Percent Recovery	Acceptable Range	RPD
Nitrite, as N	001223IC-LCS	100	109	109	90 - 110	
Nitrite, as N	001223IC-LCSD	100	108	108	90 - 110	0.9
Nitrite, as N	P0012070-01-MS	100	101	101	80 - 120	
Nitrate, as N	001223IC-LCS	100	104	104	90 - 110	
Nitrate, as N	001223IC-LCSD	100	103	103	90 - 110	1.
Nitrate, as N	P0012070-01-MS	100	106	106	80 - 120	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Ammonia, as N	001231NH3-LCS	1	1.008	101	84 - 117	
Ammonia, as N	P0012070-02-MS	1	2.8	100	76 - 124	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Sulfate	010102IC-LCS	100	106	106	90 - 110	
Sulfate	010102IC-LCSD	100	106	106	90 - 110	0.
Sulfate	L0012166-12-MS	100	270	80	80 - 120	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant
PROJECT #: NA
TEST: **BTEX by EPA SW846 Method 8021B, Dec. 1996**
MATRIX: Aqueous

PARAMETER	NEL Sample ID	Spike Amount	Spike Result	Percent Recovery	Acceptable Range	RPD
Benzene	010103BX_A-LCS	20	21.002	105	85 - 115	
Benzene	010103BX_A-LCSD	20	20.922	105	80 - 120	0.4
Benzene	P0012070-04-MS	20	20.656	103	70 - 130	
Benzene	P0012070-04-MSD	20	20.528	103	70 - 130	0.6
Toluene	010103BX_A-LCS	20	20.867	104	85 - 115	
Toluene	010103BX_A-LCSD	20	20.396	102	80 - 120	2.3
Toluene	P0012070-04-MS	20	19.796	99	70 - 130	
Toluene	P0012070-04-MSD	20	19.712	99	70 - 130	0.4
Ethylbenzene	010103BX_A-LCS	20	20.801	104	85 - 115	
Ethylbenzene	010103BX_A-LCSD	20	20.692	103	80 - 120	0.5
Ethylbenzene	P0012070-04-MS	20	20.63	103	70 - 130	
Ethylbenzene	P0012070-04-MSD	20	20.098	100	70 - 130	2.6
Total Xylenes	010103BX_A-LCS	60	62.569	104	85 - 115	
Total Xylenes	010103BX_A-LCSD	60	61.891	103	80 - 120	1.1
Total Xylenes	P0012070-04-MS	60	76.449	116	70 - 130	
Total Xylenes	P0012070-04-MSD	60	65.47	97	70 - 130	5.8

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Waste Water

PARAMETER	NEL Sample ID	Spike Amount	Spike Result	Percent Recovery	Acceptable Range	RPD
TKN (Total Kjeldahl Nitrogen)	010104TKN-LCS	1.25	1.12	90	82 - 119	
TKN (Total Kjeldahl Nitrogen)	L0012259-03-MS	1.25	1.68	90	58 - 131	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant
PROJECT #: NA

TEST: **Metals**
MATRIX: Aqueous

PARAMETER	NEL Sample ID	Spike Amount	Spike Result	Percent Recovery	Acceptable Range	RPD
Iron	P1207012-LCS	1	0.999	100	85 - 115	
Iron	P0012070-01-MS	1	1.64	105	75 - 125	
Iron	P0012070-01-MSD	1	1.79	120	75 - 125	13.3
Manganese	P12070I2-LCS	0.5	0.51	102	85 - 115	
Manganese	P0012070-01-MS	0.5	0.532	101	75 - 125	
Manganese	P0012070-01-MSD	0.5	0.537	102	75 - 125	1.

ND - Not Detected

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EL PASO NATURAL GAS Due 1/24/00

LY Lead

CHAIN OF CUSTODY RECORD

P0012070

Page 1 of 1

PROJECT NUMBER:

PROJECT NAME: San Juan River Plant

SAMPLERS (Signature): Carlos R. Padilla

DATE:

CONTRACT LABORATORY: H.E.L. Las Vegas

LAB ID	DATE	TIME	MATRIX	SAMPLE NUMBER	TOTAL NUMBER OF CONTAINERS	COMPOSITE OR GRAB	NO_2-N	NO_3-N	PO_4	SO_4	NH_3	TKN	Mn, Fe	BTEX 8021	REMARKS
01	12-21-00	12:40	Water	F00-0350	7	G	✓	✓	✓	✓	✓	✓	✓	✓	
02	12-21-00	14:10	Water	F00-0351	7	G	✓	✓	✓	✓	✓	✓	✓	✓	
03	12-21-00	12:00	Water	F00-0352	7	G	✓	✓	✓	✓	✓	✓	✓	✓	
04	12-21-00		Water	Trip Blank	2	G								✓	

Condition when received: Poor [✓ Good]

[illegible] intact: Y N [✓ None] Temp. 4 °C

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
Carlos R. Padilla	12-21-00 1545	Via Fed-X		12/22 1135	HEL-LV
RELINQUISHED BY: (Signature)	**DATE/TIME**	**RECEIVED BY: (Signature)**	**RELINQUISHED BY: (Signature)**	**DATE/TIME**	**RECEIVED OF LABORATORY BY: (Signature)**

REQUESTED TURNAROUND TIME:
☑ ROUTINE ☐ RUSH ______

CARRIER CO.:

BILL NO.:

SAMPLE RECEIPT REMARKS:

CHARGE CODE:

RESULTS & INVOICES TO:

LABORATORY SERVICES
EL PASO NATURAL GAS COMPANY
8645 RAILROAD DRIVE
EL PASO, TEXAS 79904

915-587-3729 FAX: 915-587-3835

White - Testing Laboratory Canary - EPNG Lab Pink - Field Sampler

SAMPLE KEY

SAMPLE NUMBER: F00-0198 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONIOTR WELL #5
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 15:20 SAMPLE DATE: 09/29/2000

SAMPLE KEY

SAMPLE NUMBER: F00-0199 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONIOTR WELL #6
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 13:55 SAMPLE DATE: 09/29/2000

SAMPLE KEY

SAMPLE NUMBER: F00-0200 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONIOTR WELL #7
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:45 SAMPLE DATE: 09/29/2000

ORIGINAL

SAN JUAN RIVER PLANT
QUARTERLY MONITOR WELL TESTING FIELD TESTS

Sample Number	F00-0198	F00-0199	F00-0200		Method	STORET No.
Sample Description	Monitor Well #5	Monitor Well #8	Monitor Well #9			
Sample Date	9/29/00	9/29/00	9/29/00			
Sample Time	15:20	13:55	14:45			
Field pH	5.7	7.05	4.81		EPA 150.1	00400
Field Conductivity	16,780	15,520	13,040	μS	EPA 120.1	00095
Field Temperature	16.5	16.9	15.1	°C	EPA 170.1	00010
Field Dissolved Oxygen	3.60	1.14	1.2	mg/l O_2	HACH - HRDO Method	
Field Ferrous Iron	0.04	0.07	1.27	mg/l Fe^{2+}	Hach Phenanthroline Method 1,10	
ORP Millivolts	99.30	-198.4	247.7			

NEL LABORATORIES
Reno • Las Vegas • Boise
Phoenix • Sacramento

Las Vegas Division
4208 Arcata Way, Suite A • Las Vegas, NV 89030
(702) 657-1010 • Fax: (702) 657-1577
1-888-368-3282

CLIENT: El Paso Natural Gas Company
8645 Railroad Drive
El Paso, TX 79904
ATTN: Darrell Campbell

PROJECT NAME: San Juan River Plant-M.W.
PROJECT NUMBER: NA
NEL ORDER ID: P0009093

Attached are the analytical results for samples in support of the above referenced project.

Samples submitted for this project were not sampled by NEL Laboratories. Samples were received by NEL in good condition, under chain of custody on 9/30/00.

Should you have any questions or comments, please feel free to contact our Client Services department at (602) 437-0099.

Some QA results have been flagged as follows:

C - Sample concentration is a least 5 times greater than spike contribution. Spike recovery criteria do not apply.

Stan Van Wagenen
Laboratory Manager

10/10/00
Date

CERTIFICATIONS:

	Reno	Las Vegas	S. California
Arizona	AZ0520	AZ0518	AZ0605
California	1707	2002	2264
US Army Corps of Engineers	Certified	Certified	

	Reno	Las Vegas	S. California
Idaho	Certified	Certified	
Montana	Certified	Certified	
Nevada	NV033	NV052	CA084
L.A.C.S.D.			10228

NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0198**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	9/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0009093-01

TEST: **Metals**

MATRIX: Aqueous

ANALYST: JY - Reno Division

PARAMETER	RESULT mg/L	REPORTING LIMIT	D. F.	METHOD	DIGESTED	ANALYZED
Iron	0.24	0.1 mg/L	1	EPA 6010	10/3/00	10/4/00
Manganese	1.8	0.005 mg/L	1	EPA 6010	10/3/00	10/4/00

D.F. - Dilution Factor

ND - Not Detected

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CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA

CLIENT ID: **F00-0199**
DATE SAMPLED: 9/29/00
NEL SAMPLE ID: P0009093-02

TEST: **Metals**
MATRIX: Aqueous
ANALYST: JY - Reno Division

PARAMETER	**RESULT mg/L**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**DIGESTED**	**ANALYZED**
Iron	0.32	0.1 mg/L	1	EPA 6010	10/3/00	10/4/00
Manganese	1.6	0.005 mg/L	1	EPA 6010	10/3/00	10/4/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0200**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	9/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0009093-03
TEST:	**Metals**		
MATRIX:	Aqueous	ANALYST:	JY - Reno Division

PARAMETER	RESULT mg/L	REPORTING LIMIT	D. F.	METHOD	DIGESTED	ANALYZED
Iron	1.2	0.1 mg/L	1	EPA 6010	10/3/00	10/4/00
Manganese	8.4	0.005 mg/L	1	EPA 6010	10/3/00	10/4/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	R10005i-BLK

TEST: **Metals**

PARAMETER	RESULT mg/L	REPORTING LIMIT	D. F.	METHOD	DIGESTED	ANALYZED
Iron	ND	0.1 mg/L	1	EPA 6010	10/3/00	10/4/00
Manganese	ND	0.005 mg/L	1	EPA 6010	10/3/00	10/4/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0198**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	9/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0009093-01

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	RESULT	R. L.	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	0.78	0.3	1	SM 4500-NH3 B/E	mg/L-N	10/4/00
Nitrate, as N	ND	1.	10	EPA 300.0	mg/L-N	9/30/00
Nitrite, as N	ND	1.	10	EPA 300.0	mg/L-N	9/30/00
Sulfate	14000	1000.	10000	EPA 300.0	mg/L	10/4/00
TKN (Total Kjeldahl Nitrogen)	1.7	0.3	1	SM 4500-N C/NH3 E	mg/L-N	10/3/00
Total Phosphorus	ND	0.01	1	SM 4500-P E	mg/L-P	10/6/00

R.L. - Reporting Limi
D.F. - Dilution Factor
ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA

CLIENT ID: **F00-0199**
DATE SAMPLED: 9/29/00
NEL SAMPLE ID: P0009093-02

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	RESULT	R. L.	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	ND	0.3	1	SM 4500-NH3 B/E	mg/L-N	10/4/00
Nitrate, as N	ND	1.	10	EPA 300.0	mg/L-N	9/30/00
Nitrite, as N	ND	1.	10	EPA 300.0	mg/L-N	9/30/00
Sulfate	8500	500.	5000	EPA 300.0	mg/L	10/4/00
TKN (Total Kjeldahl Nitrogen)	2.0	0.3	1	SM 4500-N C/NH3 E	mg/L-N	10/5/00
Total Phosphorus	0.076	0.01	1	SM 4500-P E	mg/L-P	10/6/00

R.L. - Reporting Limi
D.F. - Dilution Factor
ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0200**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	9/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0009093-03

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	RESULT	R. L.	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	1.8	0.3	1	SM 4500-NH3 B/E	mg/L-N	10/4/00
Nitrate, as N	ND	1.	10	EPA 300.0	mg/L-N	9/30/00
Nitrite, as N	ND	1.	10	EPA 300.0	mg/L-N	9/30/00
Sulfate	11000	500.	5000	EPA 300.0	mg/L	10/4/00
TKN (Total Kjeldahl Nitrogen)	3.2	0.3	1	SM 4500-N C/NH3 E	mg/L-N	10/5/00
Total Phosphorus	0.018	0.01	1	SM 4500-P E	mg/L-P	10/6/00

R.L. - Reporting Limi
D.F. - Dilution Factor
ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	0001003TKN-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
TKN (Total Kjeldahl Nitrogen)	ND	0.3	1	SM 4500-N C/NH3 E	mg/L	10/3/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	0001005TKN-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
TKN (Total Kjeldahl Nitrogen)	ND	0.3	1	SM 4500-N C/NH3 E	mg/L	10/5/00

D.F. - Dilution Factor

ND - Not Detected

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CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	0001006TP-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Total Phosphorus	ND	0.01	1	SM 4500-P E	mg/L-P	10/6/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA

CLIENT ID: **Method Blank**
DATE SAMPLED: NA
NEL SAMPLE ID: 000930IC-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Nitrate, as N	ND	0.1	1	EPA 300.0	mg/L-N	9/30/00
Nitrite, as N	ND	0.1	1	EPA 300.0	mg/L-N	9/30/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

NEL LABORATORIES

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA
TEST: **Non-Metals**

CLIENT ID: **Method Blank**
DATE SAMPLED: NA
NEL SAMPLE ID: 001003NH3-BLK

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	ND	0.3	1	SM 4500-NH3 B/E	mg/L	10/4/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA

CLIENT ID: **Method Blank**
DATE SAMPLED: NA
NEL SAMPLE ID: 001004IC-BLK

TEST: **Non-Metals**

PARAMETER	**RESULT**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**UNITS**	**ANALYZED**
Sulfate	ND	0.1	1	EPA 300.0	mg/L	10/4/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0198**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	9/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0009093-01

TEST:	**BTEX by EPA SW846 Method 8021B, Dec. 1996**		
METHOD:	EPA 8021B	ANALYST:	JQT - Division
MATRIX:	Aqueous	EXTRACTED:	10/9/00
DILUTION:	1	ANALYZED:	10/9/00

PARAMETER	**Result**	**Reporting Limit**
Benzene	ND	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	106	69 - 120

ND - Not Detected

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CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0199**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	9/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0009093-02

TEST: **BTEX by EPA SW846 Method 8021B, Dec. 1996**

METHOD:	EPA 8021B	ANALYST:	JQT - Division
MATRIX:	Aqueous	EXTRACTED:	10/9/00
DILUTION:	1	ANALYZED:	10/9/00

PARAMETER	**Result**	**Reporting Limit**
Benzene	284 µg/L	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	6.6 µg/L	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	99	69 - 120

ND - Not Detected

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CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0200**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	9/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0009093-03

TEST:	**BTEX by EPA SW846 Method 8021B, Dec. 1996**		
METHOD:	EPA 8021B	ANALYST:	JQT - Division
MATRIX:	Aqueous	EXTRACTED:	10/9/00
DILUTION:	1	ANALYZED:	10/9/00

PARAMETER	**Result**		**Reporting Limit**
Benzene	95	µg/L	2. µg/L
Toluene	ND		2. µg/L
Ethylbenzene	11.0	µg/L	2. µg/L
Total Xylenes	9.0	µg/L	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	106	69 - 120

ND - Not Detected

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CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA

CLIENT ID: **Trip Blank**
DATE SAMPLED: 9/29/00
NEL SAMPLE ID: P0009093-04

TEST: **BTEX by EPA SW846 Method 8021B, Dec. 1996**
METHOD: EPA 8021B
MATRIX: Aqueous
DILUTION: 1

ANALYST: JQT - Division
EXTRACTED: 10/9/00
ANALYZED: 10/9/00

PARAMETER	**Result**	**Reporting Limit**
Benzene	5.3 µg/L	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	102	69 - 120

ND - Not Detected

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CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	San Juan River Plant-M.W.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	001009BTEX_A-BLK

TEST:	**BTEX by EPA SW846 Method 8021B, Dec. 1996**		
METHOD:	EPA 8021B	ANALYST:	JQT - Division
MATRIX:	Aqueous	EXTRACTED:	10/9/00
		ANALYZED:	10/9/00

PARAMETER	**Result**	**Reporting Limit**
Benzene	ND	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	104	69 - 120

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
TKN (Total Kjeldahl Nitrogen)	0001003TKN-LCS	1.25	1.19	95	82 - 119	
TKN (Total Kjeldahl Nitrogen)	P0009093-01-MS	1.25	3.15	116	58 - 131	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
TKN (Total Kjeldahl Nitrogen)	0001005TKN-LCS	1.25	1.26	101	82 - 119	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Total Phosphorus	0001006TP-LCS	0.25	0.24	96	80 - 120	
Total Phosphorus	P0009089-01-MS	0.25	0.707	95	91 - 105	
Total Phosphorus	P0009089-01-MSD	0.25	0.709	96	91 - 105	1.

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Nitrite, as N	000930IC-LCS	100	105	105	90 - 110	
Nitrite, as N	000930IC-LCSD	100	104	104	90 - 110	1.
Nitrate, as N	000930IC-LCS	100	96	96	90 - 110	
Nitrate, as N	000930IC-LCSD	100	98	98	90 - 110	2.1
Nitrate, as N	P0009078-01-MS	100	109	98	80 - 120	

ND - Not Detected

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Ammonia, as N	001003NH3-LCS	1	1	100	84 - 117	
Ammonia, as N	L0009303-05-MS	1	1.46	101	76 - 124	

ND - Not Detected

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NEL LABORATORIES

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA

TEST: **Inorganic Non-Metals**
MATRIX: Drinking Water

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Sulfate	001004IC-LCS	100	101	101	90 - 110	
Sulfate	001004IC-LCSD	100	99	99	90 - 110	2.
Sulfate	P0009081-01-MS	10	53.2	102	36 - 136	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: San Juan River Plant-M.W.
PROJECT #: NA

TEST: **Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**		**Acceptable Range**	**RPD**
Iron	R10005i-LCS	1	1.04	104		85 - 115	
Iron	R0010005-08-MS	1	1.07	107		75 - 125	
Iron	R0010005-08-MSD	1	0.977	98		75 - 125	9.1
Manganese	R10005i-LCS	0.5	0.5	100		85 - 115	
Manganese	R0010005-08-MS	0.5	9.91	-18	C	75 - 125	
Manganese	R0010005-08-MSD	0.5	9.18	-164	C	75 - 125	-160.4

ND - Not Detected

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EL PASO NATURAL GAS

P0009093

(10/6)

CHAIN OF CUSTODY RECORD

Las Vegas Lead

Page 1 of 1

PROJECT NUMBER	PROJECT NAME	CONTRACT LABORATORY
	San Juan River Plant- M.W.	N.E.L. Las Vegas

SAMPLERS: (Signature) Charles R. Padilla DATE:

LAB ID	DATE	TIME	MATRIX	SAMPLE NUMBER	TOTAL NUMBER OF CONTAINERS	COMPOSITE OR GRAB	NO2-N NO3-N	NH3	TKN	BTEX 8021	Mn, Fe	PO4, SO4	REMARKS
(01)	9-29-00	15:20	Water	F00-0198	7	G	X X	X	X	X	X	X	
(02)	9-29-00	13:55	Water	F00-0199	7	G	X X	X	X	X	X	X	
(03)	9-29-00	14:45	Water	F00-0200	7	G	X X	X	X	X	X	X	
(04)	9-29-00	13:10	Water	Trip Blank	2	G				X			

Custody Seal Intact: Y N [✓ None] Temp: 4°C

Condition when received: Poor [✓ Good]

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
Charles R. Padilla	9-29-00 16:05		VIA Fed EX 9/30/00 0910	9/30/00 0910	NEL-LV
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED OF LABORATORY BY: (Signature)

REQUESTED TURNAROUND TIME:

☐ ROUTINE ☐ RUSH ______

CARRIER CO.

BILL NO.:

SAMPLE RECEIPT REMARKS

CHARGE CODE

RESULTS & INVOICES TO:

LABORATORY SERVICES
EL PASO NATURAL GAS COMPANY
8645 RAILROAD DRIVE
EL PASO, TEXAS 79904

915-587-3729 FAX: 915-587-3835

White - Testing Laboratory Canary - EPNG Lab Pink - Field Sampler

FM 08 0566 (Rev. 10.99)

SAMPLE KEY

SAMPLE NUMBER: F00-0155 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL #5
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 12:48 SAMPLE DATE: 06/29/2000

SAMPLE KEY

SAMPLE NUMBER: F00-0156 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL #8
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 14:35 SAMPLE DATE: 06/29/2000

SAMPLE KEY

SAMPLE NUMBER: F00-0157 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL #9
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 13:37 SAMPLE DATE: 06/29/2000

ORIGINAL

SAN JUAN RIVER PLANT
QUARTERLY MONITOR WELL TESTING FIELD TESTS

Sample Number	F00-0155	F00-0156	F00-0157		Method	STORET No.
Sample Description	Monitor Well #5	Monitor Well #8	Monitor Well #9			
Sample Date	6/29/00	6/29/00	6/29/00			
Sample Time	12:48	14:35	13:35			
Field pH	6.52	7.11	14:24		EPA 150.1	00400
Field Conductivity	18,860	13,920	16,320	µS	EPA 120.1	00095
Field Temperature	17.8	17.1	17.9	°C	EPA 170.1	00010
Field Dissolved Oxygen	1.84	2.1	0.6	mg/l O_2	HACH - HRDO Method	
Field Ferrous Iron	0.01	0.13	2.56	mg/l Fe^{2+}	Hach Phenanthroline Method 1,10	
ORP Millivolts	176.30	-217.5	292.5			

NEL LABORATORIES
Reno • Las Vegas
Phoenix • So. California

Las Vegas Division
4208 Arcata Way, Suite A • Las Vegas, NV 89030
(702) 657-1010 • Fax: (702) 657-1577
1-888-368-3282

CLIENT: El Paso Natural Gas Company
8645 Railroad Drive
El Paso, TX 79904
ATTN: Darrell Campbell

PROJECT NAME: S.J.R.P.
PROJECT NUMBER: NA

NEL ORDER ID: P0006089

Attached are the analytical results for samples in support of the above referenced project.

Samples submitted for this project were not sampled by NEL Laboratories. Samples were received by NEL in good condition, under chain of custody on 6/30/00.

Should you have any questions or comments, please feel free to contact our Client Services department at (602) 437-0099.

Some QA results have been flagged as follows:

J1 - The batch MS and/or MSD were outside acceptance limits. The batch LCS was acceptable.

Stan Van Wagenen
Laboratory Manager

7/13/00
Date

CERTIFICATIONS:

	Reno	Las Vegas	S. California
Arizona	AZ0520	AZ0518	AZ0605
California	1707	2002	2264
US Army Corps of Engineers	Certified	Certified	

	Reno	Las Vegas	S. California
Idaho	Certified	Certified	
Montana	Certified	Certified	
Nevada	NV033	NV052	CA084
L.A.C.S.D.			10228

NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0155**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	6/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0006089-01

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	0.90	0.3	1	SM 4500-NH3 B/E	mg/L-N	7/8/00
Nitrate, as N	ND	10.	100	EPA 300.0	mg/L-N	7/1/00
Nitrite, as N	ND	10.	100	EPA 300.0	mg/L-N	7/1/00
Sulfate	16000	1000.	10000	EPA 300.0	mg/L	7/7/00
TKN (Total Kjeldahl Nitrogen)	2.7	0.3	1	SM 4500-N C/NH3 E	mg/L-N	7/11/00
Total Phosphorus	ND	0.01	1	SM 4500-P E	mg/L-P	7/5/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0156**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	6/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0006089-02

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	ND	0.3	1	SM 4500-NH3 B/E	mg/L-N	7/8/00
Nitrate, as N	ND	5.	50	EPA 300.0	mg/L-N	7/1/00
Nitrite, as N	ND	5.	50	EPA 300.0	mg/L-N	7/1/00
Sulfate	7500	1000.	10000	EPA 300.0	mg/L	7/7/00
TKN (Total Kjeldahl Nitrogen)	1.8	0.3	1	SM 4500-N C/NH3 E	mg/L-N	7/11/00
Total Phosphorus	0.040	0.01	1	SM 4500-P E	mg/L-P	7/5/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0157**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	6/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0006089-03

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	2.7	0.3	1	SM 4500-NH3 B/E	mg/L-N	7/8/00
Nitrate, as N	ND	5.	50	EPA 300.0	mg/L-N	7/1/00
Nitrite, as N	ND	5.	50	EPA 300.0	mg/L-N	7/1/00
Sulfate	11000	250.	2500	EPA 300.0	mg/L	7/7/00
TKN (Total Kjeldahl Nitrogen)	4.6	0.3	1	SM 4500-N C/NH3 E	mg/L-N	7/10/00
Total Phosphorus	0.020	0.01	1	SM 4500-P E	mg/L-P	7/5/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	000701IC-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Nitrate, as N	ND	0.1	1	EPA 300.0	mg/L-N	7/1/00
Nitrite, as N	ND	0.1	1	EPA 300.0	mg/L-N	7/1/00

D.F. - Dilution Factor

ND - Not Detected

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CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	000705TP-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Total Phosphorus	ND	0.01	1	SM 4500-P E	mg/L-P	7/5/00

D.F. - Dilution Factor

ND - Not Detected

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CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA

CLIENT ID: **Method Blank**
DATE SAMPLED: NA
NEL SAMPLE ID: 000707IC-BLK

TEST: **Non-Metals**

PARAMETER	**RESULT**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**UNITS**	**ANALYZED**
Chloride	ND	0.1	1	EPA 300.0	mg/L	7/7/00
Sulfate	ND	0.1	1	EPA 300.0	mg/L	7/7/00

D.F. - Dilution Factor

ND - Not Detected

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CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
CLIENT ID: **Method Blank**
DATE SAMPLED: NA
NEL SAMPLE ID: 000708nh3-BLK

TEST: **Non-Metals**

PARAMETER	**RESULT**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**UNITS**	**ANALYZED**
Ammonia, as N	ND	0.2	1	SM 4500-NH3 B/E	mg/L	7/8/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	000710TKN-BLK
TEST:	**Non-Metals**		

PARAMETER	**RESULT**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**UNITS**	**ANALYZED**
TKN (Total Kjeldahl Nitrogen)	ND	0.3	1	SM 4500-N C/NH3 E	mg/L	7/10/00

D.F. - Dilution Factor

ND - Not Detected

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CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	000711TKN-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
TKN (Total Kjeldahl Nitrogen)	ND	0.3	1	SM 4500-N C/NH3 E	mg/L	7/11/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0155**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	6/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0006089-01

TEST:	**BTEX by EPA SW846 Method 8021B, Dec. 1996**		
METHOD:	EPA 8021B	ANALYST:	JJM - Las Vegas Division
MATRIX:	Aqueous	EXTRACTED:	7/10/00
DILUTION:	1	ANALYZED:	7/10/00

PARAMETER	**Result**	**Reporting Limit**
Benzene	ND	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	95	75 - 125

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

NEL LABORATORIES

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
CLIENT ID: **F00-0156**
DATE SAMPLED: 6/29/00
NEL SAMPLE ID: P0006089-02

TEST: **BTEX by EPA SW846 Method 8021B, Dec. 1996**
METHOD: EPA 8021B
MATRIX: Aqueous
DILUTION: 1
ANALYST: JJM - Las Vegas Division
EXTRACTED: 7/10/00
ANALYZED: 7/10/00

PARAMETER	**Result**	**Reporting Limit**
Benzene	24 µg/L	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	82	75 - 125

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0157**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	6/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0006089-03

TEST: **BTEX by EPA SW846 Method 8021B, Dec. 1996**

METHOD:	EPA 8021B	ANALYST:	JJM - Las Vegas Division
MATRIX:	Aqueous	EXTRACTED:	7/10/00
DILUTION:	1	ANALYZED:	7/10/00

PARAMETER	**Result**		**Reporting Limit**
Benzene	100	μg/L	2. μg/L
Toluene	ND		2. μg/L
Ethylbenzene	9.2	μg/L	2. μg/L
Total Xylenes	ND		2. μg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	98	75 - 125

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Trip Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	6/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0006089-04

TEST: **BTEX by EPA SW846 Method 8021B, Dec. 1996**

METHOD:	EPA 8021B	ANALYST:	JJM - Las Vegas Division
MATRIX:	Aqueous	EXTRACTED:	7/10/00
DILUTION:	1	ANALYZED:	7/10/00

PARAMETER	**Result**	**Reporting Limit**
Benzene	2.2 µg/L	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	94	75 - 125

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	000710BX20_A-BLK

TEST:	**BTEX by EPA SW846 Method 8021B, Dec. 1996**		
METHOD:	EPA 8021B	ANALYST:	JJM - Las Vegas Division
MATRIX:	Aqueous	EXTRACTED:	7/10/00
		ANALYZED:	7/10/00

PARAMETER	**Result**	**Reporting Limit**
MTBE	ND Mt	5. µg/L
Benzene	ND	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	106	75 - 125

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0155**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	6/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0006089-01
TEST:	**Metals**		
MATRIX:	Aqueous	ANALYST:	JY - Reno Division

PARAMETER	**RESULT mg/L**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**DIGESTED**	**ANALYZED**
Iron	0.38	0.3 mg/L	3	EPA 6010	7/3/00	7/10/00
Manganese	3.3	0.015 mg/L	3	EPA 6010	7/3/00	7/10/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0156**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	6/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0006089-02
TEST:	**Metals**		
MATRIX:	Aqueous	ANALYST:	JY - Reno Division

PARAMETER	RESULT mg/L	REPORTING LIMIT	D. F.	METHOD	DIGESTED	ANALYZED
Iron	0.32	0.3 mg/L	3	EPA 6010	7/3/00	7/10/00
Manganese	3.6	0.015 mg/L	3	EPA 6010	7/3/00	7/10/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0157**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	6/29/00
PROJECT #:	NA	NEL SAMPLE ID:	P0006089-03
TEST:	**Metals**		
MATRIX:	Aqueous	ANALYST:	JY - Reno Division

PARAMETER	RESULT mg/L	REPORTING LIMIT	D. F.	METHOD	DIGESTED	ANALYZED
Iron	0.85	0.3 mg/L	3	EPA 6010	7/3/00	7/10/00
Manganese	8.5	0.015 mg/L	3	EPA 6010	7/3/00	7/10/00

D.F. - Dilution Factor

ND - Not Detected

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	P06089-FeMn-BLK
TEST:	**Metals**		

PARAMETER	RESULT mg/L	REPORTING LIMIT	D. F.	METHOD	DIGESTED	ANALYZED
Iron	ND	0.1 mg/L	1	EPA 6010	7/3/00	7/10/00
Manganese	ND	0.005 mg/L	1	EPA 6010	7/3/00	7/10/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Nitrite, as N	000701IC-LCS	100	98	98	90 - 110	
Nitrite, as N	000701IC-LCSD	100	97	97	90 - 110	1.
Nitrite, as N	L0006360-02-MS	100	98	98	80 - 120	
Nitrate, as N	000701IC-LCS	100	92	92	90 - 110	
Nitrate, as N	000701IC-LCSD	100	91	91	90 - 110	1.1
Nitrate, as N	L0006360-02-MS	100	91	91	80 - 120	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Waste Water

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Total Phosphorus	000705TP-LCS	0.25	0.239	96	80 - 120	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	NEL Sample ID	Spike Amount	Spike Result	Percent Recovery	Acceptable Range	RPD
Chloride	000707IC-LCS	100	96	96	90 - 110	
Chloride	000707IC-LCSD	100	98	98	90 - 110	2.1
Sulfate	000707IC-LCS	100	98	98	90 - 110	
Sulfate	000707IC-LCSD	100	98	98	90 - 110	0.

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Drinking Water

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Ammonia, as N	000708nh3-LCS	1	1.008	101	85 - 115	
Ammonia, as N	L0007006-01-MS	1	1.064	106	80 - 120	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
TKN (Total Kjeldahl Nitrogen)	000710TKN-LCS	1.25	1.33	106	82 - 119	
TKN (Total Kjeldahl Nitrogen)	L0007010-13-MS	1.25	1.89	101	58 - 131	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Drinking Water

PARAMETER	NEL Sample ID	Spike Amount	Spike Result	Percent Recovery	Acceptable Range	RPD
TKN (Total Kjeldahl Nitrogen)	000711TKN-LCS	1.25	1.26	101	80 - 120	
TKN (Total Kjeldahl Nitrogen)	L0007049-01-MS	1.25	2.24	91	80 - 120	

ND - Not Detected

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NEL LABORATORIES

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA

CLIENT ID: **Method Blank**
DATE SAMPLED: NA
NEL SAMPLE ID: P06089-FeMn-BLK

TEST: **Metals**

PARAMETER	**RESULT mg/L**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**DIGESTED**	**ANALYZED**
Iron	ND	0.1 mg/L	1	EPA 6010	7/3/00	7/10/00
Manganese	ND	0.005 mg/L	1	EPA 6010	7/3/00	7/10/00

D.F. - Dilution Factor

ND - Not Detected

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EL PASO NATURAL GAS

7/10

P0006089

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJECT NUMBER:

PROJECT NAME: S.J. R.P

SAMPLERS: (Signature) Carlos R. Padilla

DATE:

CONTRACT LABORATORY: N.E.L. Las Vegas

LAB ID	DATE	TIME	MATRIX	SAMPLE NUMBER	TOTAL NUMBER OF CONTAINERS	COMPOSITE OR GRAB	NO_2-N	NO_3-N	NH_3	TKN	BTEX 8021	Mn, Fe	PO_4	SO_4	REMARKS
01	6-29-00	12:48	Water	F00-0155	7	G	✓	✓	✓	✓	✓	✓	✓	✓	
02	6-29-00	14:35	Water	F00-0156	7	G	✓	✓	✓	✓	✓	✓	✓	✓	
03	6-29-00	13:37	Water	F00-0157	7	G	✓	✓	✓	✓	✓	✓	✓	✓	
04				Trip Blank	2	G					✓				

Custody Seal Intact: Y N [✓ None] Temp: 3°C

Condition when received: Poor [✓ Good]

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
Carlos R. Padilla	6-29-00 16:35	Via	Fed-X	6/30 1030	
RELINQUISHED BY: (Signature)	**DATE/TIME**	**RECEIVED BY: (Signature)**	**RELINQUISHED BY: (Signature)**	**DATE/TIME**	**RECEIVED OF LABORATORY BY: (Signature)**

REQUESTED TURNAROUND TIME:

☐ ROUTINE ☐ RUSH

CARRIER CO.

BILL NO.:

SAMPLE RECEIPT REMARKS

CHARGE CODE

RESULTS & INVOICES TO:

LABORATORY SERVICES
EL PASO NATURAL GAS COMPANY
8645 RAILROAD DRIVE
EL PASO, TEXAS 79904

915-587-3729 FAX: 915-587-3835

White - Testing Laboratory Canary - EPNG Lab Pink - Field Sampler

FM-08-0566 (Rev. 10-99)

SAMPLE KEY

SAMPLE NUMBER: F00-0043 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL #5
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 13:30 SAMPLE DATE: 04/10/2000

SAMPLE KEY

SAMPLE NUMBER: F00-0044 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL #9
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 15:30 SAMPLE DATE: 04/10/2000

SAMPLE KEY

SAMPLE NUMBER: F00-0045 LOCATION: SAN JUAN RIVER PLANT
MATRIX: WATER
SAMPLE DESCRIPTION: MONITOR WELL #8
S D CONTINUED:
S D CONTINUED:
SAMPLE TIME: 16:45 SAMPLE DATE: 04/10/2000

NEL LABORATORIES
Reno • Las Vegas
Phoenix • So. California

Las Vegas Division
4208 Arcata Way, Suite A • Las Vegas, NV 89030
(702) 657-1010 • Fax: (702) 657-1577
1-888-368-3282

CLIENT: El Paso Natural Gas Company
8645 Railroad Drive
El Paso, TX 79904
ATTN: Darrell Campbell

PROJECT NAME: S.J.R.P.
PROJECT NUMBER: NA

NEL ORDER ID: P0004027

Attached are the analytical results for samples in support of the above referenced project.

Samples submitted for this project were not sampled by NEL Laboratories. Samples were received by NEL in good condition, under chain of custody on 4/12/00.

Should you have any questions or comments, please feel free to contact our Client Services department at (602) 437-0099.

Some results have been flagged as follows:

J1 - The batch MS and/or MSD were outside acceptance limits. The batch LCS was acceptable.

R1 - Reporting limit raised due to sample matrix interference.

Some QA results have been flagged as follows:

J1 - The batch MS and/or MSD were outside acceptance limits. The batch LCS was acceptable.

Stan Van Wagenen
Laboratory Manager

4/19/00
Date

CERTIFICATIONS:

	Reno	Las Vegas	S. California
Arizona	AZ0520	AZ0518	AZ0605
California	1707	2002	2264
US Army Corps of Engineers	Certified	Certified	

	Reno	Las Vegas	S. California
Idaho	Certified	Certified	
Montana	Certified	Certified	
Nevada	NV033	NV052	CA084
L.A.C.S.D.			10228

NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0043**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	4/10/00
PROJECT #:	NA	NEL SAMPLE ID:	P0004027-01
TEST:	**Metals**		
MATRIX:	Aqueous	ANALYST:	JF - Reno Division

PARAMETER	RESULT mg/L	REPORTING LIMIT	D. F.	METHOD	DIGESTED	ANALYZED
Iron	0.12	0.02 mg/L	1	EPA 6010	4/13/00	4/17/00
Manganese	3.3	0.005 mg/L	1	EPA 6010	4/13/00	4/17/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0044**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	4/10/00
PROJECT #:	NA	NEL SAMPLE ID:	P0004027-02
TEST:	**Metals**		
MATRIX:	Aqueous	ANALYST:	JF - Reno Division

PARAMETER	RESULT mg/L	REPORTING LIMIT	D. F.	METHOD	DIGESTED	ANALYZED
Iron	2.7	0.02 mg/L	1	EPA 6010	4/13/00	4/17/00
Manganese	9.2	0.005 mg/L	1	EPA 6010	4/13/00	4/17/00

D.F. - Dilution Factor

ND - Not Detected

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CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0045**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	4/10/00
PROJECT #:	NA	NEL SAMPLE ID:	P0004027-03

TEST: **Metals**

MATRIX: Aqueous

ANALYST: JF - Reno Division

PARAMETER	**RESULT mg/L**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**DIGESTED**	**ANALYZED**
Iron	1.8	0.02 mg/L	1	EPA 6010	4/13/00	4/17/00
Manganese	2.4	0.005 mg/L	1	EPA 6010	4/13/00	4/17/00

D.F. - Dilution Factor

ND - Not Detected

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CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	R04036i-BLK

TEST: **Metals**

PARAMETER	RESULT mg/L	REPORTING LIMIT	D. F.	METHOD	DIGESTED	ANALYZED
Iron	ND	0.02 mg/L	1	EPA 6010	4/13/00	4/17/00
Manganese	ND	0.005 mg/L	1	EPA 6010	4/13/00	4/17/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA

CLIENT ID: **F00-0043**
DATE SAMPLED: 4/10/00
NEL SAMPLE ID: P0004027-01

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	**RESULT**		**REPORTING LIMIT**	**D. F.**	**METHOD**	**UNITS**	**ANALYZED**
Ammonia, as N	1.8		0.3	1	SM 4500-NH3 B/E	mg/L-N	4/14/00
Nitrate, as N	ND	R1	5.	50	EPA 300.0	mg/L-N	4/12/00
Nitrite, as N	ND	R1	5.	50	EPA 300.0	mg/L-N	4/12/00
Orthophosphate, as P	ND		0.01	1	SM 4500-P E	mg/L-P	4/12/00
Sulfate	16000		500.	5000	EPA 300.0	mg/L	4/17/00
TKN (Total Kjeldahl Nitrogen)	4.8		0.3	1	SM 4500-N C/NH3 E	mg/L-N	4/17/00

D.F. - Dilution Factor

ND - Not Detected

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CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0044**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	4/10/00
PROJECT #:	NA	NEL SAMPLE ID:	P0004027-02

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	RESULT		REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	1.3		0.3	1	SM 4500-NH3 B/E	mg/L-N	4/14/00
Nitrate, as N	ND	RI	5.	50	EPA 300.0	mg/L-N	4/12/00
Nitrite, as N	ND	RI	5.	50	EPA 300.0	mg/L-N	4/12/00
Orthophosphate, as P	ND		0.01	1	SM 4500-P E	mg/L-P	4/12/00
Sulfate	12000		500.	5000	EPA 300.0	mg/L	4/17/00
TKN (Total Kjeldahl Nitrogen)	5.9		0.3	1	SM 4500-N C/NH3 E	mg/L-N	4/17/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA

CLIENT ID: **F00-0045**
DATE SAMPLED: 4/10/00
NEL SAMPLE ID: P0004027-03

TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	RESULT		REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	ND		0.3	1	SM 4500-NH3 B/E	mg/L-N	4/14/00
Nitrate, as N	ND	RI	5.	50	EPA 300.0	mg/L-N	4/12/00
Nitrite, as N	ND	RI	5.	50	EPA 300.0	mg/L-N	4/12/00
Orthophosphate, as P	0.040		0.01	1	SM 4500-P E	mg/L-P	4/12/00
Sulfate	5000		500.	5000	EPA 300.0	mg/L	4/17/00
TKN (Total Kjeldahl Nitrogen)	3.4		0.3	1	SM 4500-N C/NH3 E	mg/L-N	4/17/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA

CLIENT ID: **Method Blank**
DATE SAMPLED: NA
NEL SAMPLE ID: 000412IC-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Nitrate, as N	ND	0.1	1	EPA 300.0	mg/L-N	4/12/00
Nitrite, as N	ND	0.1	1	EPA 300.0	mg/L-N	4/12/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	000412OP-BLK

TEST: **Non-Metals**

PARAMETER	**RESULT**	**REPORTING LIMIT**	**D. F.**	**METHOD**	**UNITS**	**ANALYZED**
Orthophosphate, as P	ND	0.01	1	SM 4500-P E	mg/L-P	4/12/00

D.F. - Dilution Factor

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	000414NH3-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Ammonia, as N	ND	0.3	1	SM 4500-NH3 B/E	mg/L	4/14/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	0004171C-BLK

TEST: **Non-Metals**

PARAMETER	RESULT	REPORTING LIMIT	D. F.	METHOD	UNITS	ANALYZED
Sulfate	ND	0.1	1	EPA 300.0	mg/L	4/17/00

D.F. - Dilution Factor

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0043**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	4/10/00
PROJECT #:	NA	NEL SAMPLE ID:	P0004027-01

TEST:	**BTEX by EPA SW846 Method 8021B, Dec. 1996**		
METHOD:	EPA 8021B	ANALYST:	BBC - Division
MATRIX:	Aqueous	EXTRACTED:	4/13/00
DILUTION:	1	ANALYZED:	4/13/00

PARAMETER	**Result**	**Reporting Limit**
Benzene	ND	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	88	75 - 125

ND - Not Detected

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NEL LABORATORIES

CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**F00-0044**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	4/10/00
PROJECT #:	NA	NEL SAMPLE ID:	P0004027-02

TEST:	**BTEX by EPA SW846 Method 8021B, Dec. 1996**		
METHOD:	EPA 8021B	ANALYST:	BBC - Division
MATRIX:	Aqueous	EXTRACTED:	4/13/00
DILUTION:	1	ANALYZED:	4/13/00

PARAMETER	**Result**	**Reporting Limit**
Benzene	48 µg/L	2. µg/L
Toluene	2.1 µg/L	2. µg/L
Ethylbenzene	4.7 µg/L	2. µg/L
Total Xylenes	5.9 µg/L	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	89	75 - 125

ND - Not Detected

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NEL LABORATORIES

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
CLIENT ID: **F00-0045**
DATE SAMPLED: 4/10/00
NEL SAMPLE ID: P0004027-03

TEST: **BTEX by EPA SW846 Method 8021B, Dec. 1996**
METHOD: EPA 8021B
MATRIX: Aqueous
DILUTION: 1
ANALYST: BBC - Division
EXTRACTED: 4/13/00
ANALYZED: 4/13/00

PARAMETER	**Result**	**Reporting Limit**
Benzene	200 J1 µg/L	2. µg/L
Toluene	4.4 µg/L	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	9.5 µg/L	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	87	75 - 125

ND - Not Detected

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NEL LABORATORIES

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA

CLIENT ID: **Trip Blank**
DATE SAMPLED: 4/10/00
NEL SAMPLE ID: P0004027-04

TEST: **BTEX by EPA SW846 Method 8021B, Dec. 1996**
METHOD: EPA 8021B
MATRIX: Aqueous
DILUTION: 1

ANALYST: BBC - Division
EXTRACTED: 4/13/00
ANALYZED: 4/13/00

PARAMETER	**Result**	**Reporting Limit**
Benzene	ND	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	85	75 - 125

ND - Not Detected

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CLIENT:	El Paso Natural Gas Company	CLIENT ID:	**Method Blank**
PROJECT ID:	S.J.R.P.	DATE SAMPLED:	NA
PROJECT #:	NA	NEL SAMPLE ID:	000413AQ21-BLK

TEST:	**BTEX by EPA SW846 Method 8021B, Dec. 1996**		
METHOD:	EPA 8021B	ANALYST:	BJV - Las Vegas Division
MATRIX:	Aqueous	EXTRACTED:	4/13/00
		ANALYZED:	4/13/00

PARAMETER	**Result**	**Reporting Limit**
MTBE	ND	5. µg/L
Benzene	ND	2. µg/L
Toluene	ND	2. µg/L
Ethylbenzene	ND	2. µg/L
Total Xylenes	ND	2. µg/L

QUALITY CONTROL DATA:

Surrogate	**% Recovery**	**Acceptable Range**
a,a,a-Trifluorotoluene	100	75 - 125

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Nitrite, as N	000412IC-LCS	100	105	105	90 - 110	
Nitrite, as N	L0004017-03-MS	5	4.23	85	67 - 116	
Nitrate, as N	000412IC-LCS	100	103	103	90 - 110	
Nitrate, as N	L0004017-03-MS	5	6.38	106	80 - 120	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Aqueous

PARAMETER	NEL Sample ID	Spike Amount	Spike Result	Percent Recovery	Acceptable Range	RPD
Orthophosphate, as P	000412OP-LCS	0.25	0.241	96	85 - 115	
Orthophosphate, as P	P0004027-01-MS	0.25	0.239	96	80 - 120	
Orthophosphate, as P	P0004027-01-MSD	0.25	0.24	96	80 - 120	0.4

ND - Not Detected

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NEL LABORATORIES

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
TEST: **BTEX by EPA SW846 Method 8021B, Dec. 1996**
MATRIX: Aqueous

PARAMETER	NEL Sample ID	Spike Amount	Spike Result	Percent Recovery	Acceptable Range	RPD
Benzene	000413AQ21-LCS	20	21	105	85 - 115	
Benzene	P0004027-03-MS	20	212	60 J1	70 - 130	
Benzene	P0004027-03-MSD	20	214	70	70 - 130	
Toluene	000413AQ21-LCS	20	21	105	85 - 115	
Toluene	P0004027-03-MS	20	23	93	70 - 130	
Toluene	P0004027-03-MSD	20	23	93	70 - 130	0.
Ethylbenzene	000413AQ21-LCS	20	20	100	85 - 115	
Ethylbenzene	P0004027-03-MS	20	19	95	70 - 130	
Ethylbenzene	P0004027-03-MSD	20	19	95	70 - 130	0.
Total Xylenes	000413AQ21-LCS	60	62	103	85 - 115	
Total Xylenes	P0004027-03-MS	60	64	91	70 - 130	
Total Xylenes	P0004027-03-MSD	60	63	89	70 - 130	1.9

ND - Not Detected

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
TEST: **Inorganic Non-Metals**
MATRIX: Waste Water

PARAMETER	NEL Sample ID	Spike Amount	Spike Result	Percent Recovery	Acceptable Range	RPD
Ammonia, as N	000414NH3-LCS	1	1.008	101	80 - 120	
Ammonia, as N	000414NH3-LCSD	1	1.008	101	80 - 120	0.
Ammonia, as N	L0004102-01-MS	1	1.008	101	80 - 120	

ND - Not Detected

This report shall not be reproduced except in full, without the written approval of the laboratory.

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA

TEST: **Inorganic Non-Metals**
MATRIX: Drinking Water

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Sulfate	000417IC-LCS	100	102	102	90 - 110	
Sulfate	000417IC-LCSD	100	100	100	90 - 110	2.
Sulfate	P0004024-09-MS	100	139	92	80 - 120	
Sulfate	P0004024-09-MSD	100	150	103	80 - 120	11.3

ND - Not Detected

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NEL LABORATORIES

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA

TEST: **Inorganic Non-Metals**
MATRIX: Waste Water

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
TKN (Total Kjeldahl Nitrogen)	L0004107-02-MS	1.25	61.88	70	70 - 130	

ND - Not Detected

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NEL LABORATORIES

CLIENT: El Paso Natural Gas Company
PROJECT ID: S.J.R.P.
PROJECT #: NA
TEST: **Metals**
MATRIX: Aqueous

PARAMETER	**NEL Sample ID**	**Spike Amount**	**Spike Result**	**Percent Recovery**	**Acceptable Range**	**RPD**
Iron	R04036i-LCS	1	0.909	91	85 - 115	
Iron	R0004036-01-MS	1	1.11	89	75 - 125	
Iron	R0004036-01-MSD	1	1.1	88	75 - 125	1.1
Manganese	R04036i-LCS	0.5	0.52	104	85 - 115	
Manganese	R0004036-01-MS	0.5	0.517	100	75 - 125	
Manganese	R0004036-01-MSD	0.5	0.52	101	75 - 125	0.6

ND - Not Detected

Due 4/19/00 Vegas Lead P0004027

EL PASO NATURAL GAS

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJECT NUMBER:

PROJECT NAME: S.J.R.P.

SAMPLERS: (Signature) Charles R. Padilla

DATE:

CONTRACT LABORATORY: H.E.L. / L.V.

LAB ID	DATE	TIME	MATRIX	SAMPLE NUMBER	TOTAL NUMBER OF CONTAINERS	COMPOSITE OR GRAB	REQUESTED ANALYSIS: NO_2-N NO_3-N	NH_3	TKN	BTEX 8021	Mn, Fe	PO_4, SO_4	REMARKS
01	4-10-00	13:30	Water	F00-0043	7	G	x x	x	x	x	x	x	Run NO_3 NO_2 Separately.
02	4/10-00	15:30	Water	F00-0044	7	G	x x	x	x	x	x	x	Also Run O-Phos, if not
03	4/10-00	16:45	Water	F00-0045	7	G	x x	x	x	x	x	x	enough sample run Total Phos
04				Trip Blank	2	G				x			per Kristina 4/12/00 TF 0930

Custody Seal Intact: Y N [✓ None] Temp: 7°C

Condition when received: Poor [✓ Good]

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
Charles R. Padilla	4-11-00 / 1500	To Fed EX			
RELINQUISHED BY: (Signature)	**DATE/TIME**	**RECEIVED BY:** (Signature)	**RELINQUISHED BY:** (Signature)	**DATE/TIME**	**RECEIVED OF LABORATORY BY:** (Signature)
VIA Fed X	4/12/00 0905	Talia Foter			

REQUESTED TURNAROUND TIME:
☒ ROUTINE ☐ RUSH

CARRIER CO.

BILL NO.:

SAMPLE RECEIPT REMARKS

CHARGE CODE

RESULTS & INVOICES TO:

LABORATORY SERVICES
EL PASO NATURAL GAS COMPANY
8645 RAILROAD DRIVE
EL PASO, TEXAS 79904

915-587-3729 FAX: 915-587-3835

White - Testing Laboratory Canary - EPNG Lab Pink - Field Sampler

FM-08-0566 (Rev. 10-89)

SAN JUAN RIVER PLANT

GROUNDWATER REMEDIATION WORK PLAN

December 2000

Prepared For

EL PASO NATURAL GAS
FARMINGTON, NEW MEXICO

Project 62800362

RECEIVED
JAN 29 2001
ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262

SAN JUAN RIVER PLANT

GROUNDWATER REMEDIATION WORK PLAN

December 2000

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EL PASO NATURAL GAS
FARMINGTON, NEW MEXICO

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4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262

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3 SITE BACKGROUND 1

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APPENDIX A - PROPOSED AIR SPARGING EQUIPMENT

1 INTRODUCTION

At the request of El Paso Natural Gas Company (EPNG), PSC has prepared the following Work Plan for a groundwater remediation pilot test at the San Juan River Plant (Plant).

The Plant is located in Section 1, Township 29 North, Range 15 West, in San Juan County, New Mexico, approximately one mile north of Kirtland, New Mexico on San Juan County Rd. 6500. The Plant is situated on approximately 630 acres.

The Plant was previously owned by El Paso Natural Gas Company (EPNG), and is currently owned and operated by Western Gas Processors, Ltd. EPNG has pursued environmental issues at the Plant since 1985. EPNG installed 21 monitoring wells (MW) between 1985 and 1995 to evaluate groundwater quality and characteristics and determine if impacts to the environment may have been the result of plant activities.

2 OBJECTIVE

The objective of the workplan is to describe a Pilot Study that will determine the feasibility of using air-sparging technologies to reduce levels of hydrocarbons in groundwater to below regulatory standards. Regulatory drivers for soil and groundwater at this site include the New Mexico Oil Conservation Division's (NMOCD) Remediation of Leaks, Spills, and Releases Guidelines and the New Mexico Water Quality Control Commission's (NMWQCC) Regulations 3-103. Concentrations of benzene in groundwater from monitoring wells MW-08 and MW-09 have historically been above NMWQCC standards. EPFS will operate this pilot test to determine if air sparging is a suitable method for remediating the groundwater at monitoring wells MW-08 and MW-09. The locations of the monitoring wells are shown on Figure 1.

3 SITE BACKGROUND

A number of studies were conducted at the Plant from 1985 to 1995. Relevant studies are summarized below.

In 1985, Geoscience Consultants, Ltd. (GCL) conducted an investigation prior to submittal of a discharge plan. GCL identified petroleum hydrocarbon-impacted groundwater in two of nine piezometers installed during the investigation. In two other wells installed during the investigation a "petroliferous odor" was described, but sample results were not reported.

K.W. Brown and Associates (KWB&A) conducted a study in 1987 to support the land treatment and disposal of approximately 9.67 million gallons of non-contact wastewater produced annually at the Plant. This report focused primarily on the potential effect of land treatment and disposal of wastewater on the soil and groundwater at the Plant. An extensive evaluation of local soil and groundwater was completed which described site specific geology, hydrology, and groundwater quality.

KWB&A also installed three monitoring wells and piezometers in 1987 to further evaluate groundwater quality and groundwater flow in the land application areas, as well as the feasibility of land application of discharge water from the Plant. Piezometers installed during a Phase II investigation indicated the wastewater ponds appeared to be leaking and were considered the source of groundwater for the east portion of the Plant and may have influenced local groundwater flow characteristics.

In 1992, the South Flare Pit and North Flare Pits were closed with Closure Summaries submitted to the NMOCD on February 8, 1993. These reports detailed remediation efforts when removing hydrocarbon-contaminated soil from the old flare pit locations. Remediation of the South Flare Pit began on September 28, 1992, and a total of 18,200 cubic yards of contaminated material was removed. MW-04, 200 feet south of the South Flare Pit, did not show hydrocarbon contamination in groundwater samples collected in December of 1992.

Remediation activities at the North Flare Pit began on October 29, 1992. Approximately 3,520 cubic yards of contaminated soil was removed from the pit. Sampling of monitor well P-08, located 100 feet down gradient of the North Flare Pit, showed no benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations. The soil excavated from the pits has been landfarmed at the site. Details of the flare pit closures are outlined in EPNG's September 16, 1992 report.

EPNG produced soil sampling and analysis reports, dated August 3, 1995, and August 22, 1995, documenting the soil sampling and analysis from the former ponds at the Plant. Soil samples collected during this sampling event were analyzed for common cations and anions, total petroleum hydrocarbons (TPH), and BTEX.

The former wastewater evaporation ponds were closed by EPNG in late 1995 and early 1996. Pit and pond closure activities resulted in capping the ponds with low permeability, compacted soil. The activities were summarized in a letter report to the NMOCD dated November 26, 1996.

The most recent investigation at the Plant was completed in the summer of 1995. During this phase of work Philip abandoned 17 wells, upgraded two wells, and installed five new monitoring wells. The abandoned wells had been installed between 1985 and 1987 to aid in the characterization of potential contaminant migration and to support the installation of the landfarm. EPNG chose to abandon these wells because they were no longer required or were found to be unusable. Three of the five new wells were installed to replace three of the abandoned wells in areas where EPNG wished to continue monitoring groundwater. These wells were replaced because they did not have accurate well construction data to allow them to be useful. Philip's 1995 report titled "Monitoring Well Installation, Upgrade and Abandonment" details this work. A soil and soil-gas investigation was also conducted in 1995 using Philip's RECON® van. Soil and soil-gas samples were collected from areas adjacent to three wells that EPNG had identified as areas of concern. Philip's August 1995 report titled "Soil Gas and Soil Survey" presents the results of this work.

Based on these past studies, it appears hydrocarbons remain concentrated in these isolated areas.

4 PROPOSED REMEDIAL ACTION

EPNG currently conducts quarterly groundwater sampling at the Plant. Historical data from groundwater samples at two of the wells indicate that benzene concentrations in groundwater are above NMWQCC standards. Based upon past success EPNG believes that air sparging in the impacted groundwater around monitoring wells MW-08 and MW-09 will supply oxygen to indigenous microorganisms that will reduce benzene concentrations in the groundwater to below NMWQCC standards.

4.1 Proposed Technology

EPNG proposes injecting a low flow of air beneath impacted groundwater and pulsing that flow by turning the system off for a period of 12 hours every day to help reduce channeling and induce bioremediation. A low flow of air into the groundwater will also help volatilize the contaminants as well as encourage bioremediation of these components by supplying oxygen to microorganisms in both groundwater and the vadose zone. No vent testing will be conducted during this pilot test.

One advantage of using low flow air sparging is that volatile organic hydrocarbons are not directly discharged to the atmosphere. Low flow air injection systems produce no condensate, no liquid wastes, and no contaminated air stream, and since there is no discharge to the atmosphere, do not require air permitting. A process and instrumentation diagram is shown on Figure 2.

Examples of the equipment or similar equipment to be used are included in Appendix A.

5 TECHNICAL APPROACH

EPNG proposes to install two sparge wells approximately 10 feet up-gradient from MW-08 and MW-09. Historical groundwater data indicates that the sparge wells should be installed just south of MW-08 and MW-09. The sparge wells will be constructed in unconsolidated sediment to a total depth of approximately 20 feet below the water table providing bedrock is not encountered. If bedrock is encountered, the wells will be installed below the water table and just above the bedrock if possible. The wells will be constructed with two-inch PVC casing and 0.01 inch slotted well screen. The entire length of the well screen will be submerged beneath the water table and will be two feet in length.

A 10-20 grade silica sand filter pack will be placed from the bottom of the boring to approximately one to two feet above the well screen. A bentonite seal will be placed above the filter pack to two feet above the water table. The remainder of the annular space will be grouted with a neat cement/bentonite slurry seal to the surface. The proposed sparge well construction is shown on Figure 3.

6 PILOT TEST METHODOLOGY

EPNG anticipates initiating the pilot test by sparging on 12-hour cycles. Extensive testing conducted by the United States Air Force Center for Environmental Excellence (AFCEE), and EPNG's experience in the local area, has shown that sparge systems are more effective when the air injected into a formation is pulsed. The pulsing helps to prevent and close preferential pathways that may be generated by overpressuring the formation. These pathways essentially short-circuit the treatment process and reduce the effectiveness of the sparge system. EPNG anticipates injecting 10 cubic feet per minute (cfm) of air into each well at 50 pounds per square inch (psi).

7 SYSTEM MONITORING

Groundwater samples will be collected from MW-08 and MW-09 before, two weeks after startup, and after the pilot test, following standard purging and sampling methods. Dissolved oxygen readings will be recorded immediately before the pilot test and weekly thereafter for the duration of the pilot test to evaluate radius of influence and biologic activity. Groundwater samples will be analyzed for BTEX using US Environmental Protection Agency (USEPA) Method 8021. Forty-eight hours prior to sample collection, the sparge system will be shut-off to ensure natural groundwater conditions are encountered and the samples are not biased by the system. EPNG will operate the pilot test system for a period of one month, unless a decision is made to operate the system longer.

After the sampling event at the end of the one-month testing period, sampling will continue at the regularly scheduled quarterly time frame until four consecutive clean quarters have been achieved.

In the event sample analysis indicates groundwater above standards, a decision will be made by EPNG to operate the air sparge system or use an alternative method for treating the groundwater.

8 REPORTING

At the completion of the air sparge pilot test, EPNG will submit a report summarizing the results. Included in the report will be a diagram showing locations of the existing MW's and sparge wells, pressure readings recorded during the pilot test activities and groundwater analytical results for all sample events conducted during the pilot test.

9 REGULATORY REQUIREMENTS

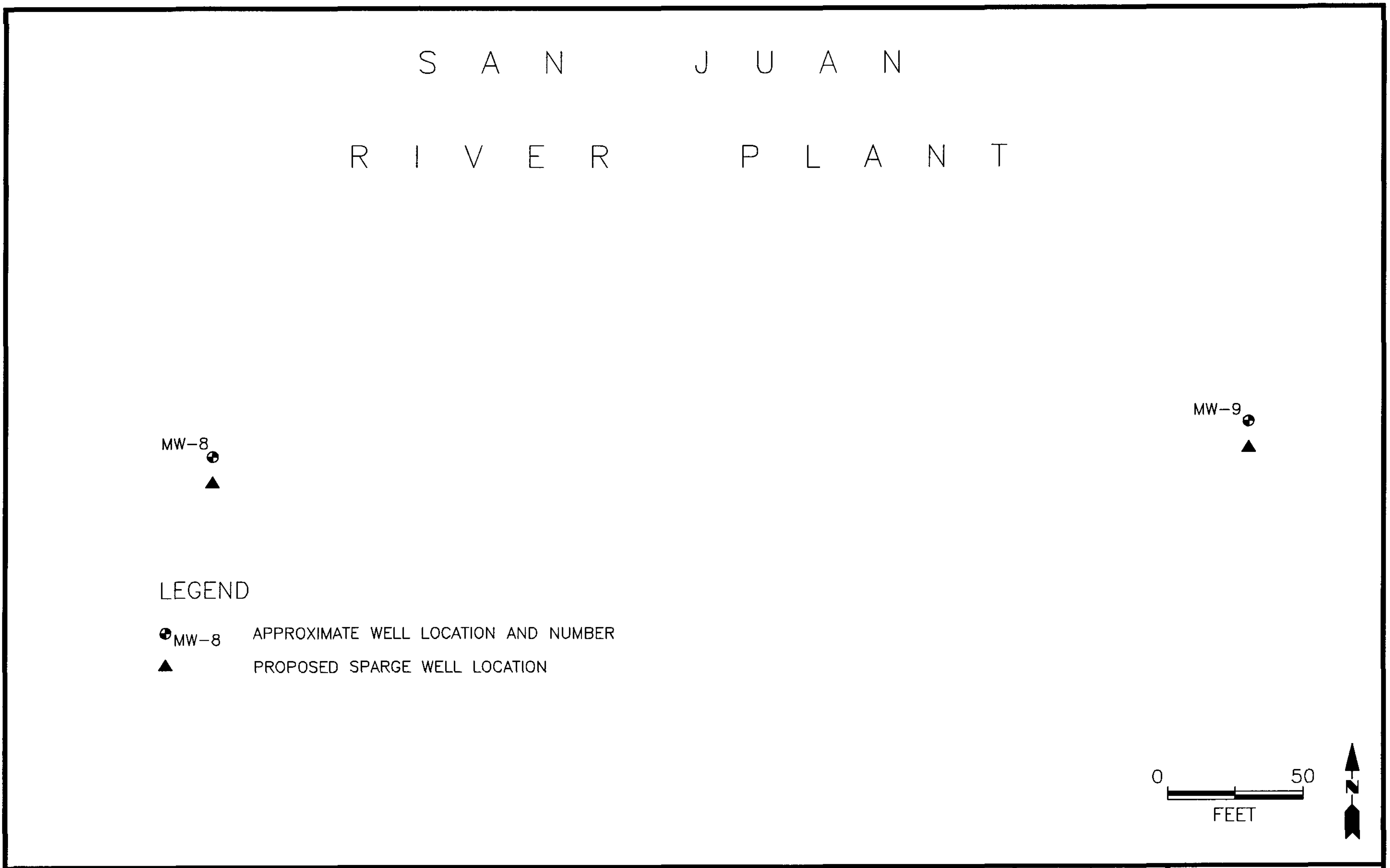
The San Juan River Plant is subject to quarterly groundwater sampling requirements that are submitted to the NMOCD in an annual report.

The system will be turned off 48 hours prior to any scheduled groundwater-sampling event to allow the groundwater conditions to stabilize prior to groundwater-sampling activities.

10 SUMMARY

EPNG proposes to perform a Pilot Test to determine the feasibility of remediating groundwater at the San Juan River Plant using air sparging technologies. Air sparging is proposed to supply air/oxygen to promote bioremediation of hydrocarbons in the groundwater.

Figure 1 – Location of Existing and Proposed Wells



PHILIP SERVICES CORP.

TITLE:
PROPOSED SPARGE WELLS
SAN JUAN RIVER PLANT

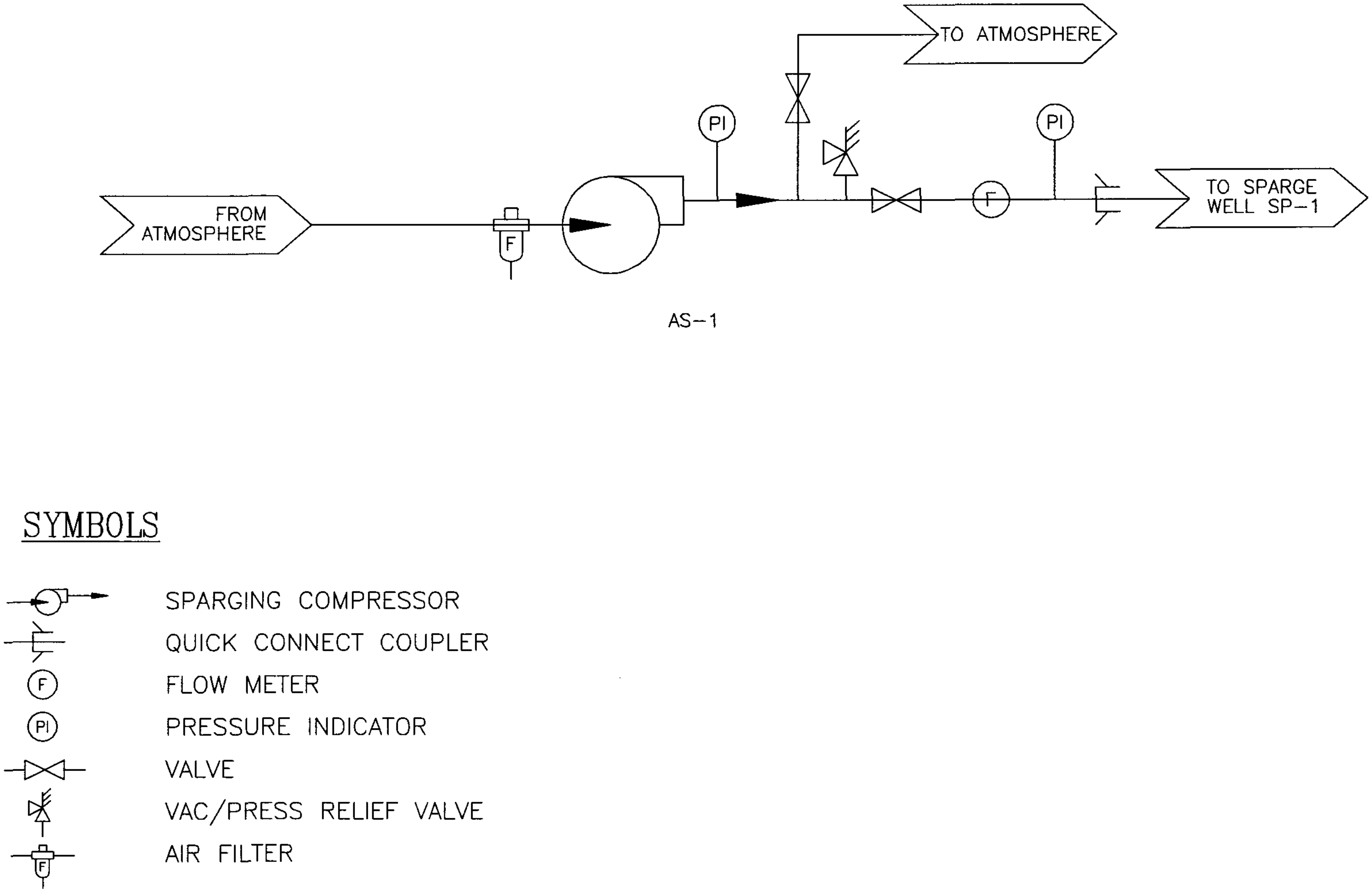
DWN: TMM
DES.: RT
CHKD:
APPD:
DATE: 11/20/00
REV.: 0

PROJECT NO.: 62800362
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

FIGURE 1

COL 628\00063A-001

Figure 2 – Proposed Pilot System Process and Instrumentation Diagram



PSC
PHILIP SERVICES
CORP.

TITLE:
PROPOSED PILOT SYSTEM PROCESS
AND INSTRUMENTATION DIAGRAM

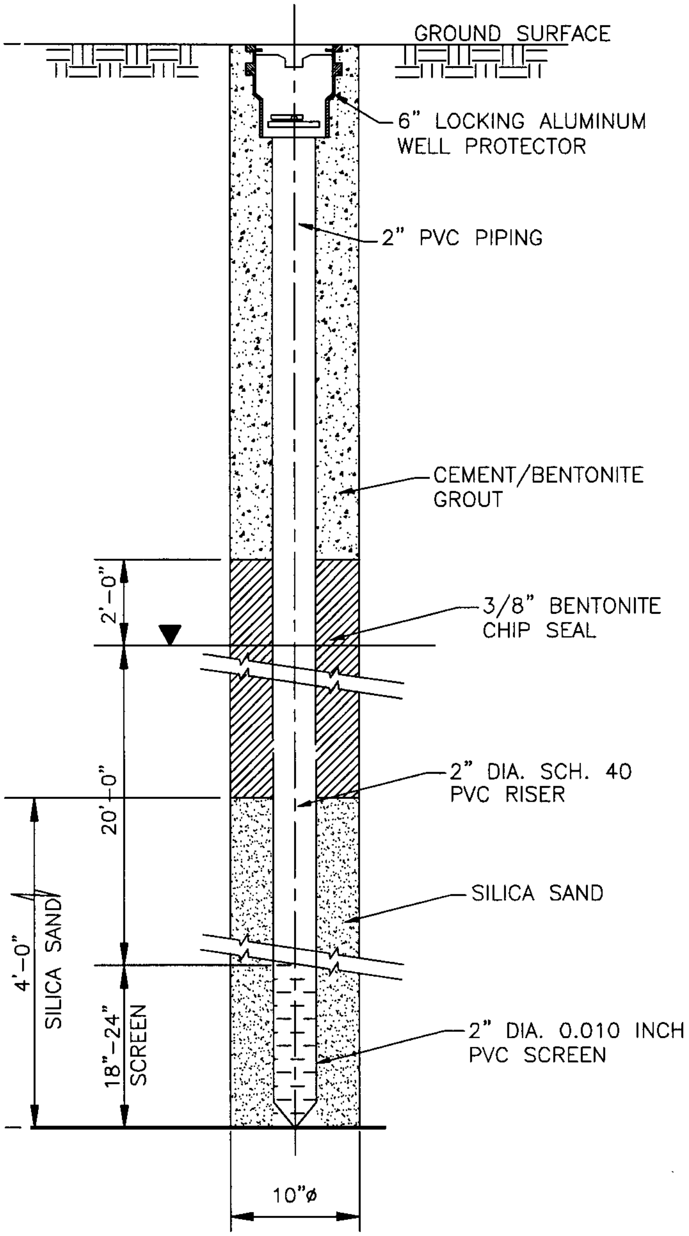
DWN: TMM	DES.: CF
CHKD:	APPD:
DATE: 12/7/00	REV.:

PROJECT NO.: 62800362
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

FIGURE 2

COL 628\00063C-001

Figure 3 – Proposed Sparge Well Detail



PROPOSED SPARGE WELL
NOT TO SCALE

PHILIP SERVICES CORP.

TITLE:
PROPOSED SPARGE
WELL DETAIL

DWN: TMM
DES.: CF
CHKD:
APPD:
DATE: 12/12/00
REV.: 0

PROJECT NO.: 62800362
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

FIGURE 3

COL. 628\00063B-001

Appendix A – Proposed Air Sparging Equipment

FORM AJ 403

GAST®

OPERATING INSTRUCTIONS & PARTS MANUAL

OIL-LESS AIR COMPRESSOR

MODEL 4Z707

READ CAREFULLY BEFORE ATTEMPTING TO ASSEMBLE, INSTALL, OPERATE OR MAINTAIN THE PRODUCT DESCRIBED. PROTECT YOURSELF AND OTHERS BY OBSERVING ALL SAFETY INFORMATION. FAILURE TO COMPLY WITH INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE! RETAIN INSTRUCTIONS FOR FUTURE REFERENCE.

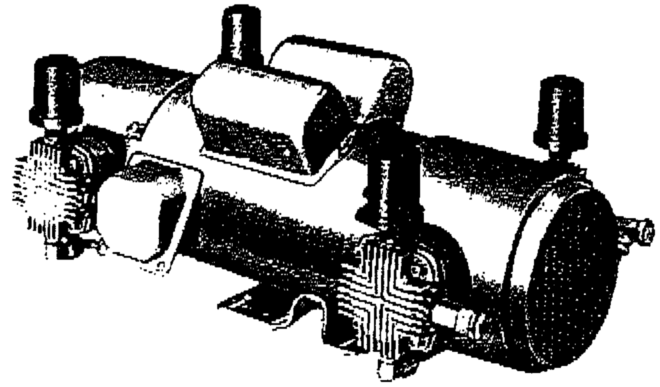


Figure 1

Description

The Gast oil-less air compressor is specifically designed to give long life under demanding conditions. Specially suited for providing compressed air for aeration, dental, food processing, pneumatic controls, computer electronics, OEM equipment, etc.

Specifications

MODEL	HP	VOLTS @ 60 HZ.	MAX. PRESS.	DISPL. CFM	DIMENSIONS			Wt
					W	H	L	
4Z707	2	230	100 PSI	10.9	12.25	8.75	22.50	80

Replace Copies 5/22/98

Product Specifications

GAST MANUFACTURING, INC.
A Unit of IDEX Corporation
Post Office Box 97
Benton Harbor, Michigan
Ph: 616/926-6171
Fax: 616/925-8288

PART NUMBER: RTD333
REVISION: B

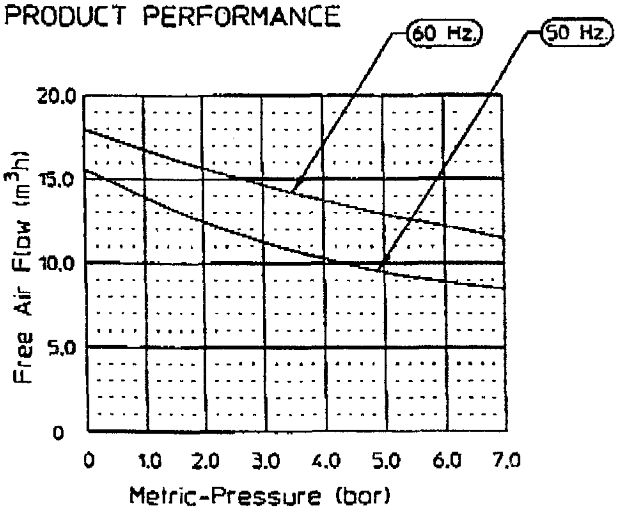
WLB

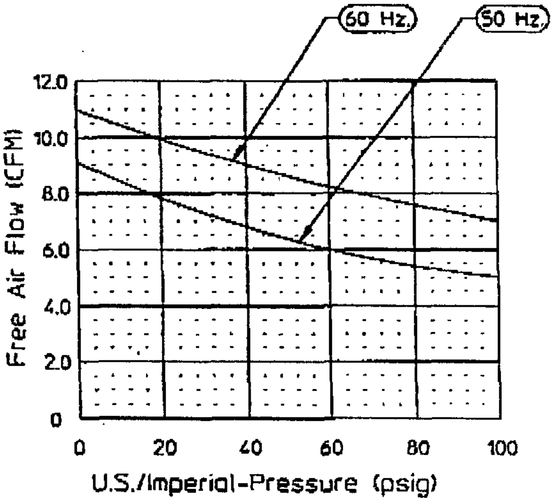
Model Number	Motor	RPM		HP	kW	Net Wt.	
		60 cycle	50 cycle			lbs.	kg
8HDM-19-M850X	115/230-1 110/220-1	1725	1425	2	1.1	80.5	36.50

SOUND LEVEL 84 dB(A)
NORMAL AMBIENT +5 degC - +40 degC
RELATIVE HUMIDITY 20% - 80%
ENVIRONMENT Clean Dust Free

- TECHNICAL DATA SUBJECT TO CHANGE WITHOUT NOTICE.

PRODUCT PERFORMANCE

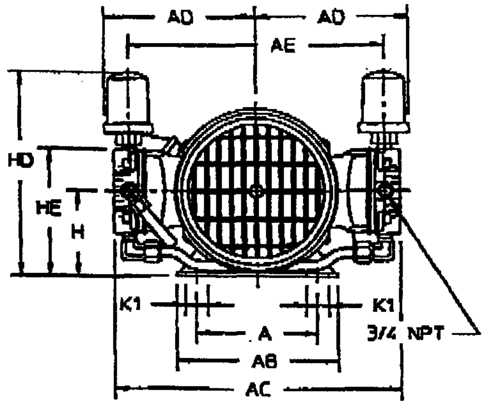


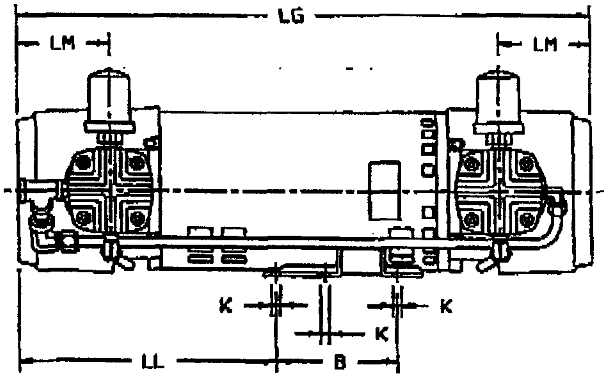


PRODUCT DIMENSIONS

- METRIC (mm)
- ALL DIMENSIONS ARE REFERENCE ONLY

Model Number	A	AB	AC	AD	AE	AF	B	H	HC	HD	HE	K	K1	LE	LG	LL	LM
8HDM-19-M850X	124	165	290	155	261	---	127	89	---	213	133	9	32	---	548	195	97





General Safety Information

CAUTION: Never lubricate this dry oil-less piston pump. The teflon filled rings are self-lubricating and require no oil. The motor bearings are grease packed for the life of the bearing.

WARNING: TO AVOID EXPLOSIVE HAZARD, DO NOT PUMP COMBUSTIBLE LIQUIDS OR VAPORS WITH THESE UNITS OR USE IN AN AMBIENT THAT CONTAINS COMBUSTIBLE VAPORS OR LIQUIDS.

IMPORTANT: UNIT COMES WITH PRE-SET SAFETY VALVE. DO NOT MAKE ANY ADJUSTMENTS TO THIS VALVE. IF VALVE MALFUNCTIONS, REPLACE IT. ALL ELECTRIC WIRING TO THIS UNIT SHOULD BE DONE IN ACCORDANCE WITH LOCAL AND STATE CODES. UNIT SHOULD BE ELECTRICALLY GROUNDED FOR SAFETY.

Operation

CAUTION: DO NOT exceed maximum pressure on compressor. When operating compressor under start-stop conditions, use properly rated pressure switch.

Installation

Select a cool, clean area for location of compressor.

ELECTRICAL

1. Wiring instructions are located on plate covering electrical terminals.
2. When wiring is completed, secure plate to original position.

NOTE: Do not discard this plate.

PIPING

Use only discharge pipe or tubing ID equal to or greater than pump discharge port.

Maintenance

CLEANING

NOTE: Unit requires NO flushing.

To remove filter, proceed as follows using Figure 2 as reference:

1. Twist and remove plastic jar of inlet filter (Ref. No. 1) to expose felt element.
2. Remove felt from holder and check condition.
3. Clean or replace felt element as required.

NOTE: Dust off felt element if it becomes dirty.

4. Replace plastic jar.

INSPECTION

Regular inspection may prevent expensive repairs.

CAUTION: If pump or motor shows evidence of overheating or excessive noise, stop immediately for repairs.

DISASSEMBLY

It is not necessary to remove the filter (Ref. No. 1) from the cylinder head (Ref. No. 4) as metal chips could be dislodged and enter the unit.

1. Remove the shroud (Ref. No. 19), cylinder head, and valve components.
2. DO NOT re-arrange the valve components.
3. Remove the cylinder (Ref. No. 10) and rings.
4. Make sure all parts are clean before reassembling.
5. DO NOT use any chlorinated solvents to clean valves, or any liquids to flush units.

IMPORTANT: THE STAINLESS STEEL VALVES MAY BE CLEANED WITH WATER. ALL PARTS, EXCEPT THE VALVES, CAN BE CLEANED WITH ANY INDUSTRIAL, NON-FLAMMABLE, NON-TOXIC, CLEANING SOLVENT.

RE-ASSEMBLY

1. Install piston seals (Ref. No. 12), piston rings (Ref. No. 11), and the rider ring (Ref. No. 14) on the piston (Ref. No. 13).
2. Locate ring joints approximately opposite each other.
3. Attach cylinder to shaft end motor bracket with the cylinder screws (Ref. No. 31) and 1/4" washers.
4. Tighten screws finger tight.
5. Move piston to top, dead center position.
6. Adjust the cylinder flush with the top of the piston and torque cylinder screws to 150 lb. in.
7. Re-torque a second time.
8. Stack the valve components in order as shown in the detail. The valve leaf is pre-bent and should not be adjusted in any way.
9. Install the cylinder head, lockwashers and head screws. The exhaust ports in the cylinder head have been marked by omitting the ends of the fins.
10. Torque the head screws to 95-105 lb. in. and re-torque a second time.

ORDER REPLACEMENT PARTS BY CALLING TOLL FREE

1-800-323-0620

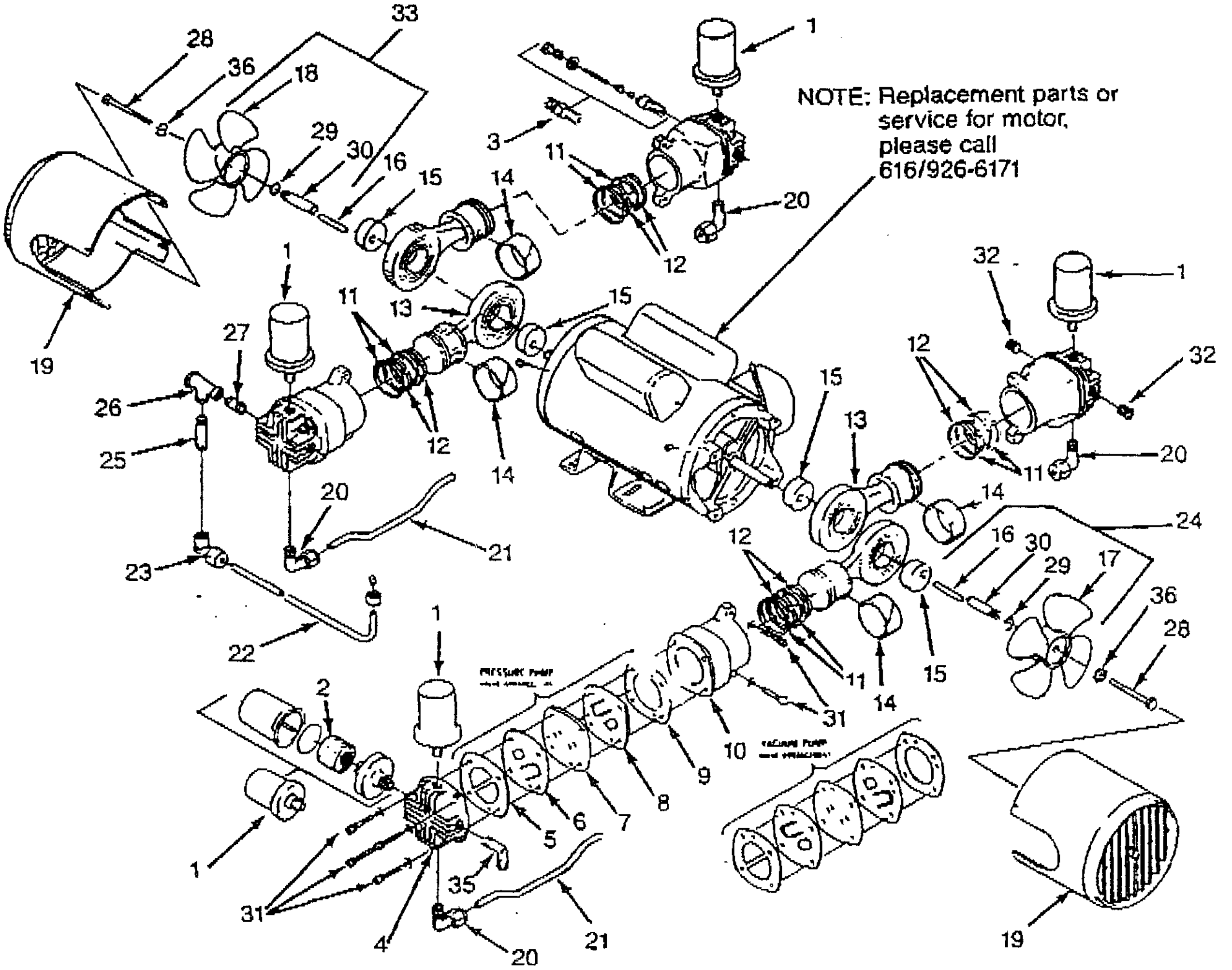
Please provide following information:

- Model Number
- Serial Number (if any)
- Part Description and Number as shown in Parts List.

Address parts correspondence to:

Parts Company of America

1250 Busch Parkway
Buffalo Grove, IL 60089



NOTE: Replacement parts or service for motor, please call 616/926-6171

Figure 2 — Replacement Parts Illustration

REF. NO.	DESCRIPTION	PART NO.	QTY.
1	Filter assembly	B300F	4
2	●Filter felt	B344A	4
3	†Safety valve	AF720A	1
4	Cylinder head	AF507	4
5	●Head gasket	AF520A	4
6	●Outlet valve	AF545	4
7	Valve plate	AF543	4
8	●Inlet valve	AF544	4
9	●Cylinder gasket	AF521	4
10	Cylinder	AF509	4
11	●Piston ring	AF541	8
12	●Piston seal	AF540	8
13	Piston rod assembly	AH356M	4
14	●Rider ring	AF595	4
15	Eccentric	AF515M	4
16	Square key	AB136F	2
17	CCW fan	AF662	1
18	CW fan	AF661	1
19	Shroud	AF656	2
20	Elbow fitting w/nut & sleeve	AF537A	4
21	Manifold	AF550A	2
22	Manifold	AF659	1
23	Flareless elbow	AF665	1
24	Fan & adapter assem., CCW	AF748	1
25	Nipple	BA707	1
26	Reducing tee	BA409	1
27	Close nipple	BA706C	1
28	Fan screw, 1/4-20 x 2¼"	BB663	2
29	Retaining ring	AF663	2
30	Fan adaptor	AF743	2
31	Socket head cap screw, 1/4-20 x 1"	BB619	24
32	Cylinder head plug	BA503	5
33	Fan & adapter assem., CW	AF747	1
34*	Shroud screw, 8-32 x 5/8"	BB417	8
35	Elbow fitting w/nut & sleeve	AF664	1
36	1/4" Lockwasher	AF744	2

(●) Included in Service kit K303.
(†) Adjustable safety valve.

KOBOLD KSM FLOWMETER

User Instructions

CAUTION: **For safety reasons, please read the cautionary information located at the end of the manual, before attempting installation.**

1.0 - General

The KOBOLD KSM flowmeter is a high volume measuring device, intended for applications in which the corrosion resistance of synthetic materials (plastic) is required.

The KSM operates on the principle of the variable area flowmeter (float in a conical tube).

The KSM may be outfitted with setpoint relays (reed type - as many as fit on the rear rail) to allow control of external electronics by triggering on flow rate information.

A reed contact chain may be mounted on the measuring tube which, in conjunction with a magnet in the float, can give a nearly continuous electrical output signal indicating flow rate. This signal may be coupled to a bar graph or digital type display to allow remote reading of the flow rate as a percentage of full scale.

The display electronics used by the reed contact chain also contains two setpoint relays capable of switching motor type loads and an analog output signal proportional to float movement (user selected to be 0-20 mA or 4-20 mA).

2.0 - Specifications

Operating Principle:	Variable area orifice
Dimensions:	See Diagram 2.3
Display:	Directly read, calibrated for Air or H_2O Electronic display available
Range:	See Table 2.2 & Diagram 2.3
Operating Temperature:	32° F to 140° F
Maximum Internal Pressure:	145 PSIG

KOBOLD KSM FLOWMETER

User Instructions

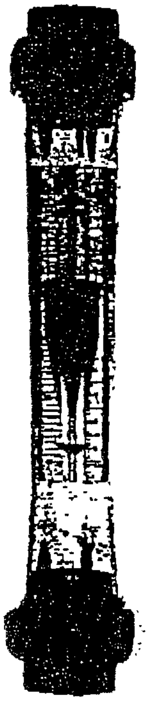


Table 2.1: Material Composition

Body:		Trogamid-T* or Polysulfone
Float:	KSM X001 to KSM-X300	PVDF
	KSM X600	PVC
Float Stop:		PVDF
O Rings:		EPDM
Fittings:		PVC

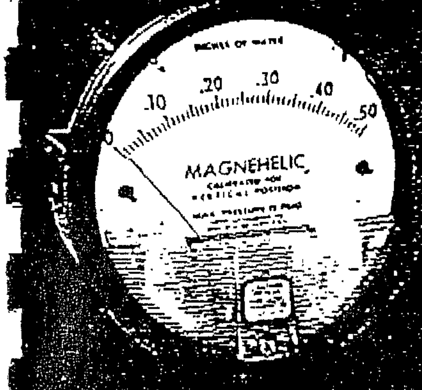
Table 2.2: Air Scales/Meter Types at Various Pressures

Model	Optional Air Scales								
	Nm³/h (0 PSIG)	Nm³/h (14.2 PSIG)	Nm³/h (28.4 PSIG)	Nm³/h (42.7 PSIG)	Nm³/h (56.9 PSIG)	Nm³/h (71.1 PSIG)	Nm³/h (85.3 PSIG)	Nm³/h (99.6 PSIG)	Nm³/h (114 PSIG)
SM X001	0.8-5	1.2-7	1.4-9	1.6-10	2-12	2-13	2-14	2.5-14	2.5-15
SM X005	2-18	3-25	4-30	5-35	5-40	6-43	6-45	7-50	6-52
SM X010	4-34	6-50	8-60	8-70	10-74	10-84	10-90	12-96	12-100
SM X020	10-70	12-90	14-120	15-130	20-150	20-160	20-170	20-190	20-200
SM X030	10-90	15-130	20-160	20-190	25-210	25-230	30-250	30-260	30-280
M X060	22-190	30-260	40-380	40-400	50-450	50-480	75-500	70-550	75-550
M X120	45-370	60-520	80-660	100-760	100-840	100-900	100-1000	120-1000	140-1100
M X200	60-580	90-800	100-1060	120-1200	150-1300	150-1500	150-1500	200-1700	200-1800
M X300	100-860	140-1200	200-1500	200-1700	250-1900	250-2100	300-2200	300-2400	300-2500
M X600									

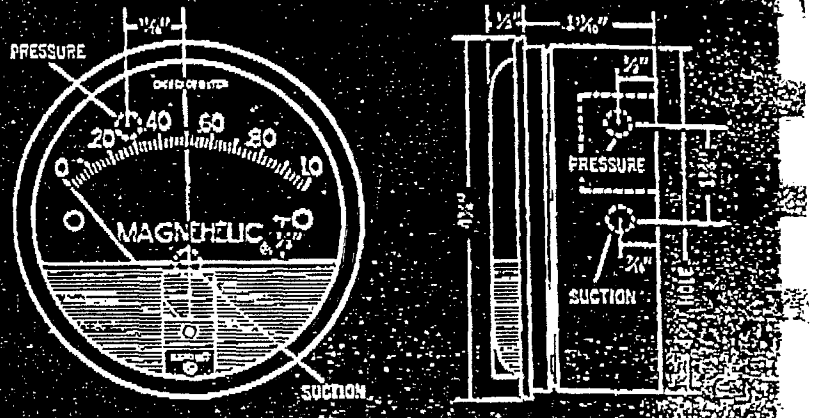
Dwyer

SERIES 2000 Magnehelic® Differential Pressure Ga

Indicate low air or gas pressures—positive, negative or differential. Accurate within 2%. 81 Ranges.



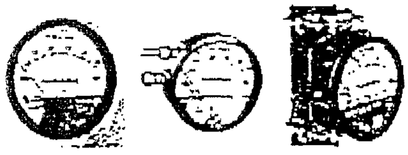
Magnehelic® Pressure Gage has a large, easy-to-read 4" dial.



Dimensions, Standard Series 2000 Magnehelic® Pressure Gages (Slightly different on medium and high pressure models)

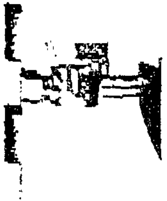
Select the Dwyer Magnehelic* gage for high accuracy — guaranteed within 2% of full scale — and for the wide choice of 81 ranges available to suit your needs precisely. Using Dwyer's simple, frictionless Magnehelic* movement, it quickly indicates low air or non-corrosive gas pressures — either positive, negative (vacuum) or differential. The design resists shock, vibration and over-pressures. No manometer fluid to evaporate, freeze or cause toxic or leveling problems. It's inexpensive, too.

Widely used to measure fan and blower pressures, filter resistance, air velocity, furnace draft, pressure drop across orifice plates, liquid levels with bubbler systems and pressures in fluid amplifier or fluidic systems. It also checks gas-air ratio controls and automatic valves, and monitors blood and respiratory pressures in medical care equipment.



Flush... Surface... or Pipe Mounted

Mounting. A single case size is used for most ranges of Magnehelic gages. They can be flush or surface mounted with standard hardware supplied. With the optional A-610 Pipe Mounting Kit they may be conveniently installed on horizontal or vertical 1¼"-2" pipe. Although calibrated for vertical position, many ranges above 1 inch may be used at any angle by simply re-zeroing. However, for maximum accuracy, they must be calibrated in the same position in which they are used. These characteristics make Magnehelic gages ideal for both stationary and portable applications. A 4½" hole is required for flush panel mounting. Complete mounting and connection fittings plus instructions are furnished with each instrument.



Vent valves

In applications where pressure is continuous and the Magnehelic gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

HIGH AND MEDIUM PRESSURE MODELS

Installation is similar to standard gages except that a 4¾" hole is needed for flush mounting. The medium pressure construction is rated for internal pressures up to 35 psig and the high pressure up to 80 psig. Available in all ranges. Because of larger case, will not fit in portable case. Weight 1 lb., 10 oz. (Installation of the A-321 safety relief valve on standard Magnehelic gages often provides adequate protection against infrequent overpressure; see Bulletin S-101)

PHYSICAL DATA

Ambient temperature range: 20° to 140°F.*

Rated total pressure: −20" Hg. to 15 psig.†

Connections: ⅛" NPT high and low pressure taps duplicated – one pair side and one pair on back.

Housing: Die cast aluminum. Case and aluminum parts Iridite-dipped to withstand 168 hour salt spray test. Exterior finish is baked dark gray hammerloid.

Standard ranges: See facing page.

Accuracy: Plus or minus 2% of full scale (3% on -0 and 4% on -00 ranges), throughout range at 70°F.

Standard accessories: Two ⅛" NPT plugs for duplicate pressure taps, two ⅛" pipe thread to rubber tubing adapters, and three flush mounting adapters with screws. (Mounting ring and snap ring retainer substituted for 3 adapters in MP & HP gage accessories.)

Weight: 1 lb. 2 oz.

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*Low temperature models available as special option.

†For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and high pressure options at lower left.

OPTIONS AND ACCESSORIES

Transparent overlays

Furnished in red and green to highlight and emphasize critical pressures.

Adjustable signal flag

Integral with plastic gage cover; has external reset screw. Available for all ranges (not high pressure). Can be ordered with gage or separately.

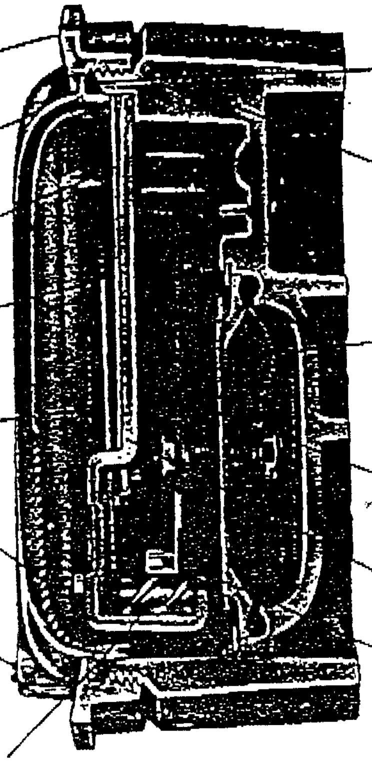
Portable units

Combine carrying case with any Magnehelic gage of standard range (not high pressure). Includes 9 ft. of 3⁄16" I.D. rubber tubing, stand-hang bracket, and terminal tube with holder.

Air filter gage accessory package

Adapts any standard Magnehelic for use as an air filter gage. Includes aluminum surface-mounting bracket with screws, two 5 ft. lengths of ¼" aluminum tubing, two static pressure tips and two molded plastic vent valves, integral compression fittings on both tips and valves.

Quality design and construction features



provides flange for flush mount-panel.

plastic face is highly resistant to ge. Provides undistorted viewing ter and scale.

on litho-printed scale is accurate sy to read.

ped pointer of heat treated alumi- bing is easy to see. It is rigidly d on helix shaft.

stops of molded rubber prevent over-travel without damage.

e bearings are shock-resistant d; provide virtually friction-free for helix. Motion damped with cosity silicone fluid.

justment screw is conveniently n plastic cover, accessible with- oving cover. "O" ring seal pro- ssure tightness.

"O" ring seal for cover assures pressure integrity of case.

Die cast aluminum case is precision made. Iridite-dipped to withstand 168 hour salt spray test. Exterior finished in baked dark gray hammerloid. One case size used for all standard pressure ranges, and for both surface and flush mounting.

Silicone rubber diaphragm with integrally molded "O" ring is supported by front and rear plates. It is locked and sealed in position with a sealing plate and retaining ring. Diaphragm motion is restricted to prevent damage due to overpressures.

Calibrated range spring is a flat leaf of Swedish spring steel in temperature compensated design. Small amplitude of motion assures consistency and long life. It reacts to pressure on diaphragm. Live length adjustable for calibration.

"Wishbone" assembly provides mounting for helix, helix bearings and pointer shaft.

Samarium cobalt magnet mounted at end of range spring rotates helix without mechanical linkages.

Helix is precision milled from an alloy of high magnetic permeability, deburred and annealed in a hydrogen atmosphere for best magnetic qualities. Mounted in jeweled bearings, it turns freely to align with magnetic field of magnet to transmit pressure indication to pointer.

EL PASO
FIELD SERVICES

April 4, 1997

Mr. William Olson
New Mexico Oil Conservation Division
2040 S. Pacheco
Santa Fe, NM 87505

RE: San Juan River Plant Landfarm

Dear Mr. Olson:

In response to your letter of February 29, 1997 regarding closure of the San Juan River Plant Landfarm, please find attached the benzene, ethylbenzene, toluene, and xylene sample results from the four landfarm cells. Also attached is the laboratory Quality Assurance / Quality Control data. These samples were collected in November of 1996. All measured levels were within specified clean up levels. If you need any additional information to support final closure of the landfarm, please call me at (505) 599-2256.

Sincerely yours,

David Bays

David Bays
Sr. Environmental Scientist

cc: Denny Foust - NMOCD - Aztec
S. D. Miller/R. D. Cosby/SJRP Landfarm Project file

El Paso Field Services Company P.O. Box 4990 Farmington, New Mexico 87499 Phone (505) 325-2841 Fax (505) 599-2119

EL PASO
FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960963
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1118
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #1-1

Field Remarks: ______

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 115 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

95.4% Solid
Narrative:

Approved By: ______ Date: 12/9/96

960963.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960964
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1120
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #1-2

Field Remarks: ______________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 114 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

94.2% Solid
Narrative:

Approved By: ______________________ Date: 12/9/96

960964.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960965
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1123
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #1-3

Field Remarks: ______________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

—BTEX is by EPA Method 8020 —

The Surrogate Recovery was at 112 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

91.3% Solid
Narrative:

Approved By: ______________________ Date: 12/9/96

960965.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960966
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1126
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #1-4

Field Remarks:

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 113 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

91.7% Solid
Narrative:

Approved By:

Date: 12/9/96

960966.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY

ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960967
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1130
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #1-5

Field Remarks: ________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

—BTEX is by EPA Method 8020—

The Surrogate Recovery was at 113 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

92.0% Solid
Narrative:

Approved By: ________________ Date: 12/9/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960968
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1138
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #2-1

Field Remarks: ____________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 111 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

91.6% Solid
Narrative:

Approved By: ____________________ Date: 12/9/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960969
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1142
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #2-2

Field Remarks: ______

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	< 1	MG/KG				
TOLUENE	< 1	MG/KG				
ETHYL BENZENE	< 1	MG/KG				
TOTAL XYLENES	< 3	MG/KG				
TOTAL BTEX	< 6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 108 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

92.4% Solid
Narrative:

Approved By: ______ Date: 12/9/96

960969.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960970
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1145
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #2-3

Field Remarks:

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 110 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

91.0% Solid
Narrative:

Approved By: John Farler

Date: 12/9/96

960970.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960971
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1148
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/28/96
TYPE | DESCRIPTION:	Soil	Cell #2-4

Field Remarks: ____________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	< 1	MG/KG				
TOLUENE	< 1	MG/KG				
ETHYL BENZENE	< 1	MG/KG				
TOTAL XYLENES	< 3	MG/KG				
TOTAL BTEX	< 6	MG/KG				

—BTEX is by EPA Method 8020 —

The Surrogate Recovery was at 107 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

91.9% Solid
Narrative:

Approved By: ____________ Date: 12/9/96

960971.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960972
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1152
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/28/96	11/28/96
TYPE | DESCRIPTION:	Soil	Cell #2-5

Field Remarks: ____________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

--BTEX is by EPA Method 8020 --

The Surrogate Recovery was at 108 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

91.9% Solid
Narrative:

Approved By: ____________________ Date: 12/9/96

960972.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960973
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1152
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/28/96	11/28/96
TYPE | DESCRIPTION:	Soil	Cell #2-5

Field Remarks: Field Duplicate

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 104 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

91.9% Solid
Narrative:

Approved By:

Date: 12/9/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960974
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1232
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/28/96	11/28/96
TYPE | DESCRIPTION:	Soil	Cell #3-1

Field Remarks: ____________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

--BTEX is by EPA Method 8020 --

The Surrogate Recovery was at 102 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

91.7% Solid
Narrative:

Approved By: ____________ Date: 12/9/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960975
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1234
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/28/96	11/28/96
TYPE | DESCRIPTION:	Soil	Cell #3-2

Field Remarks: ____________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 100 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

85.3% Solid
Narrative:

Approved By: ____________________ Date: 12/9/96

960975.XLS,12/4/96

EL PASO
FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960976
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1243
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/26/96	11/26/96
TYPE | DESCRIPTION:	Soil	Cell #3-3

Field Remarks: ____________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 101 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

88.5% Solid
Narrative:

Approved By: ____________________ Date: 12/9/96

960976.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960977
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1246
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/26/96	11/26/96
TYPE | DESCRIPTION:	Soil	Cell #3-4

Field Remarks: ______________________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	< 1	MG/KG				
TOLUENE	< 1	MG/KG				
ETHYL BENZENE	< 1	MG/KG				
TOTAL XYLENES	< 3	MG/KG				
TOTAL BTEX	< 6	MG/KG				

--BTEX is by EPA Method 8020 --

The Surrogate Recovery was at 101 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

89.3% Solid
Narrative:

Approved By: ______________________ Date: 12/9/96

960977.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960978
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1251
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/26/96	11/26/96
TYPE | DESCRIPTION:	Soil	Cell #3-5

Field Remarks: ____________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	< 1	MG/KG				
TOLUENE	< 1	MG/KG				
ETHYL BENZENE	< 1	MG/KG				
TOTAL XYLENES	< 3	MG/KG				
TOTAL BTEX	< 6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 101 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

89.6% Solid
Narrative:

Approved By: John Date: 12/9/96

960978.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960979
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1253
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/26/96	11/26/96
TYPE | DESCRIPTION:	Soil	Cell #3-6

Field Remarks: ______________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 102 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

89.5% Solid
Narrative:

Approved By: ______________________ Date: 12/9/96

960979.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960980
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1259
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/26/96	11/26/96
TYPE | DESCRIPTION:	Soil	Cell #3-7

Field Remarks: ____________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 102 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

92.8% Solid
Narrative:

Approved By: ____________ Date: 12/9/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960981
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1301
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/26/96	11/26/96
TYPE | DESCRIPTION:	Soil	Cell #3-8

Field Remarks:

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 103 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

87.8% Solid
Narrative:

Approved By:

Date: 12/9/96

960981.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960982
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1307
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/26/96	11/26/96
TYPE | DESCRIPTION:	Soil	Cell #3-9

Field Remarks: ______________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	< 1	MG/KG				
TOLUENE	< 1	MG/KG				
ETHYL BENZENE	< 1	MG/KG				
TOTAL XYLENES	< 3	MG/KG				
TOTAL BTEX	< 6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 102 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

84.3% Solid
Narrative:

Approved By: ______________________ Date: 12/9/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960983
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1309
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/26/96	11/26/96
TYPE | DESCRIPTION:	Soil	Cell #3-10

Field Remarks: ______________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	< 1	MG/KG				
TOLUENE	< 1	MG/KG				
ETHYL BENZENE	< 1	MG/KG				
TOTAL XYLENES	< 3	MG/KG				
TOTAL BTEX	< 6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 105 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

89.1% Solid
Narrative:

Approved By: ______________________ Date: 12/9/96

960983.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960984
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1316
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #3-11

Field Remarks:

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	< 1	MG/KG				
TOLUENE	< 1	MG/KG				
ETHYL BENZENE	< 1	MG/KG				
TOTAL XYLENES	< 3	MG/KG				
TOTAL BTEX	< 6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 109 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

84.2% Solid
Narrative:

Approved By:

Date: 12/9/96

960984.XLS,12/4/96

EL PASO
FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960985
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1318
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #3-12

Field Remarks: ____________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 109 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

85.8% Solid
Narrative:

Approved By: John

Date: 12/9/96

960985.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960986
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1321
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #3-13

Field Remarks: ________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 108 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

90.1% Solid
Narrative:

Approved By: ________________ Date: 12/9/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960987
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1328
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #3-14

Field Remarks:

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 111 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

85.7% Solid
Narrative:

Approved By:

Date: 12/9/96

960987.XLS,12/4/96

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960988
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1328
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #3-14

Field Remarks: Field Duplicate

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

--BTEX is by EPA Method 8020 --

The Surrogate Recovery was at 111 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

86.8% Solid
Narrative:

Approved By: John [illegible]

Date: 12/9/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960989
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1338
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #4-1

Field Remarks: ______

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	< 1	MG/KG				
TOLUENE	< 1	MG/KG				
ETHYL BENZENE	< 1	MG/KG				
TOTAL XYLENES	< 3	MG/KG				
TOTAL BTEX	< 6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 105 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

86.0% Solid
Narrative:

Approved By: ______ Date: 12/9/96

960989.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960990
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1340
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #4-2

Field Remarks: ________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	< 1	MG/KG				
TOLUENE	< 1	MG/KG				
ETHYL BENZENE	< 1	MG/KG				
TOTAL XYLENES	< 3	MG/KG				
TOTAL BTEX	< 6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 106 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

74.9% Solid
Narrative:

Approved By: John Lobdu Date: 12/9/96

960990.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960991
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1344
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #4-3

Field Remarks: ______________________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 108 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

83.5% Solid
Narrative:

Approved By: John Lader Date: 12/9/96

960991.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960992
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1349
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #4-4

Field Remarks: ______________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	< 1	MG/KG				
TOLUENE	< 1	MG/KG				
ETHYL BENZENE	< 1	MG/KG				
TOTAL XYLENES	< 3	MG/KG				
TOTAL BTEX	< 6	MG/KG				

--BTEX is by EPA Method 8020 --

The Surrogate Recovery was at 108 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

84.9% Solid
Narrative:

Approved By: ______________________ Date: 12/9/96

960992.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960993
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1352
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/28/96	11/28/96
TYPE | DESCRIPTION:	Soil	Cell #4-5

Field Remarks: ____

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

--BTEX is by EPA Method 8020 --

The Surrogate Recovery was at 99.3 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

84.3% Solid
Narrative:

Approved By: ____ Date: 12/9/96

960993.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960994
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1354
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #4-6

Field Remarks: ______

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 108 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

87.1% Solid
Narrative:

Approved By: ______ Date: 12/9/96

960994.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960995
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1402
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #4-7

Field Remarks:

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 111 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

82.8% Solid
Narrative:

Approved By:

Date: 12/9/96

EL PASO FIELD SERVICES
FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960996
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1404
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #4-8

Field Remarks: ____________________

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 111 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

84.5% Solid
Narrative:

Approved By: ____________________ Date: 12/9/96

960996.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960997
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1407
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/27/96	11/27/96
TYPE | DESCRIPTION:	Soil	Cell #4-9

Field Remarks: ______

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

–BTEX is by EPA Method 8020 –

The Surrogate Recovery was at 111 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

85.4% Solid
Narrative:

Approved By: ______ Date: 12/9/96

960997.XLS,12/4/96

EL PASO FIELD SERVICES

FIELD SERVICES LABORATORY
ANALYTICAL REPORT

SAMPLE IDENTIFICATION

	Field ID	Lab ID
SAMPLE NUMBER:	N/A	960998
MTR CODE | SITE NAME:	N/A	San Juan River Plant
SAMPLE DATE | TIME (Hrs):	11/18/96	1407
PROJECT:	San Juan Landfarm Closure	
DATE OF BTEX EXT. | ANAL.:	11/28/96	11/28/96
TYPE | DESCRIPTION:	Soil	Cell #4-9

Field Remarks: Field Duplicate

RESULTS

PARAMETER	RESULT	UNITS	QUALIFIERS			
			DF	Q		
BENZENE	<1	MG/KG				
TOLUENE	<1	MG/KG				
ETHYL BENZENE	<1	MG/KG				
TOTAL XYLENES	<3	MG/KG				
TOTAL BTEX	<6	MG/KG				

--BTEX is by EPA Method 8020 --

The Surrogate Recovery was at 94.2 % for this sample All QA/QC was acceptable.
DF = Dilution Factor Used

85.5% Solid
Narrative:

Approved By:

Date: 12/5/96

EPFS
EL PASO FIELD SERVICES

QUALITY CONTROL REPORT

EPA METHOD 8020 - BTEX

Samples: 960963 - 960975; 960993 and 960998

QA/QC for 11/27/96 Sample Set

LABORATORY CALIBRATION CHECKS, LABORATORY CONTROL SAMPLES:

SAMPLE NUMBER ICV LA-52589 50 PPB	TYPE	EXPECTED RESULT PPB	ANALYTICAL RESULT PPB	%R	ACCEPTABLE		
					RANGE	YES	NO
Benzene	Standard	50.0	54.3	109	75 - 125 %	X	
Toluene	Standard	50.0	54.8	110	75 - 125 %	X	
Ethyl benzene	Standard	50.0	54.4	109	75 - 125 %	X	
m & p - Xylene	Standard	100	112	112	75 - 125 %	X	
o - Xylene	Standard	50.0	54.2	108	75 - 125 %	X	

SAMPLE NUMBER LCS LA-45476 25 PPB	TYPE	EXPECTED RESULT PPB	ANALYTICAL RESULT PPB	%R	ACCEPTABLE		
					RANGE	YES	NO
Benzene	Standard	25.0	24.9	99.6	39 - 150	X	
Toluene	Standard	25.0	25.8	103	46 - 148	X	
Ethyl benzene	Standard	25.0	25.7	103	32 - 160	X	
m & p - Xylene	Standard	50.0	55.6	111	Not Given	X	
o - Xylene	Standard	25.0	25.6	102	Not Given	X	

SAMPLE NUMBER CCV1 LA-52589 50 PPB	TYPE	EXPECTED RESULT PPB	ANALYTICAL RESULT PPB	%R	ACCEPTABLE		
					RANGE	YES	NO
Benzene	Standard	50.0	55.3	111	75 - 125 %	X	
Toluene	Standard	50.0	55.6	111	75 - 125 %	X	
Ethyl benzene	Standard	50.0	55.4	111	75 - 125 %	X	
m & p - Xylene	Standard	100	115	115	75 - 125 %	X	
o - Xylene	Standard	50.0	55.0	110	75 - 125 %	X	

SAMPLE NUMBER CCV2 LA-52589 50 PPB	TYPE	EXPECTED RESULT PPB	ANALYTICAL RESULT PPB	%R	ACCEPTABLE		
					RANGE	YES	NO
Benzene	Standard	50.0	51.4	103	75 - 125 %	X	
Toluene	Standard	50.0	52.6	105	75 - 125 %	X	
Ethyl benzene	Standard	50.0	51.6	103	75 - 125 %	X	
m & p - Xylene	Standard	100	109	109	75 - 125 %	X	
o - Xylene	Standard	50.0	51.4	103	75 - 125 %	X	

SAMPLE NUMBER CCV3 LA-52589 50 PPB	TYPE	EXPECTED RESULT PPB	ANALYTICAL RESULT PPB	%R	ACCEPTABLE		
					RANGE	YES	NO
Benzene	Standard	50.0	49.0	98.0	75 - 125 %	X	
Toluene	Standard	50.0	49.3	98.6	75 - 125 %	X	
Ethyl benzene	Standard	50.0	48.6	97.2	75 - 125 %	X	
m & p - Xylene	Standard	100	103	103	75 - 125 %	X	
o - Xylene	Standard	50.0	48.2	96.4	75 - 125 %	X	

Narrative: Acceptable.

LABORATORY DUPLICATES:

SAMPLE NUMBER 960963	TYPE	SAMPLE RESULT ug/L	DUPLICATE RESULT ug/L	RPD	RANGE	ACCEPTABLE YES	NO
Benzene	Extraction Dup	<1.0	<1.0	0.00	+/- 35 %	X	
Toluene	Extraction Dup	<1.0	<1.0	0.00	+/- 35 %	X	
Ethyl benzene	Extraction Dup	<1.0	<1.0	0.00	+/- 35 %	X	
m & p - Xylene	Extraction Dup	<2.0	<2.0	0.00	+/- 35 %	X	
o - Xylene	Extraction Dup	<1.0	<1.0	0.00	+/- 35 %	X	

Narrative: Acceptable.

LABORATORY DUPLICATES:

SAMPLE NUMBER NA	TYPE	SAMPLE RESULT ug/L	DUPLICATE RESULT ug/L	RPD	RANGE	ACCEPTABLE YES	NO
Benzene	Extraction Dup			0	+/- 35 %	NA	
Toluene	Extraction Dup			0	+/- 35 %	NA	
Ethyl benzene	Extraction Dup			0	+/- 35 %	NA	
m & p - Xylene	Extraction Dup			0	+/- 35 %	NA	
o - Xylene	Extraction Dup			0	+/- 35 %	NA	

Narrative:

LABORATORY DUPLICATES:

SAMPLE NUMBER 960963	TYPE	SAMPLE RESULT PPM ug/L	DUPLICATE RESULT PPM ug/L	RPD	RANGE	ACCEPTABLE YES	NO
Benzene	Matrix Duplicate	<1.0	<1.0	0.00	+/- 35 %	X	
Toluene	Matrix Duplicate	<1.0	<1.0	0.00	+/- 35 %	X	
Ethyl benzene	Matrix Duplicate	<1.0	<1.0	0.00	+/- 35 %	X	
m & p - Xylene	Matrix Duplicate	<2.0	<2.0	0.00	+/- 35 %	X	
o - Xylene	Matrix Duplicate	<1.0	<1.0	0.00	+/- 35 %	X	

Narrative: Acceptable.

LABORATORY DUPLICATES:

SAMPLE NUMBER NA	TYPE (Analysis, Portion, or Sample)	SAMPLE RESULT PPM ug/L	DUPLICATE RESULT PPM ug/L	RPD	RANGE	ACCEPTABLE YES	NO
Benzene	Matrix Duplicate			0	+/- 35 %	NA	
Toluene	Matrix Duplicate			0	+/- 35 %	NA	
Ethyl benzene	Matrix Duplicate			0	+/- 35 %	NA	
m & p - Xylene	Matrix Duplicate			0	+/- 35 %	NA	
o - Xylene	Matrix Duplicate			0	+/- 35 %	NA	

Narrative:

LABORATORY SPIKES:

SAMPLE NUMBER 960963	SPIKE ADDED PPB	SAMPLE RESULT PPB	SPIKE SAMPLE RESULT PPB	%R	RANGE	ACCEPTABLE YES	NO
Benzene	50.0	<1.0	54.8	110	75 - 125 %	X	
Toluene	50.0	<1.0	55.8	112	75 - 125 %	X	
Ethyl benzene	50.0	<1.0	55.4	111	75 - 125 %	X	
m & p - Xylene	100.0	<2.0	114	114	75 - 125 %	X	
o - Xylene	50.0	<1.0	55.0	110	75 - 125 %	X	

Narrative: Acceptable.

LABORATORY SPIKES:

SAMPLE NUMBER NA	SPIKE ADDED PPB 50.00	SAMPLE RESULT PPB	SPIKE SAMPLE RESULT PPB	%R	RANGE	ACCEPTABLE YES	 NO
Benzene	50.0			0	75 - 125 %	NA	
Toluene	50.0			0	75 - 125 %	NA	
Ethyl benzene	50.0			0	75 - 125 %	NA	
m & p - Xylene	100.0			0	75 - 125 %	NA	
o - Xylene	50.0			0	75 - 125 %	NA	

Narrative:

ADDITIONAL ANALYTICAL BLANKS:

SAMPLE ID AUTO BLANK/BOILED WATER	SOURCE	PPB	STATUS
Benzene	Boiled Water	<1.0	ACCEPTABLE
Toluene	Boiled Water	<1.0	ACCEPTABLE
Ethyl benzene	Boiled Water	<1.0	ACCEPTABLE
Total Xylenes	Boiled Water	<3.0	ACCEPTABLE

Narrative: Acceptable.

SAMPLE ID SOIL VIAL BLANK	SOURCE	PPB	STATUS
Benzene	Vial + Boiled Water	<1.0	ACCEPTABLE
Toluene	Vial + Boiled Water	<1.0	ACCEPTABLE
Ethyl benzene	Vial + Boiled Water	<1.0	ACCEPTABLE
Total Xylenes	Vial + Boiled Water	<3.0	ACCEPTABLE

Narrative: Acceptable.

SAMPLE ID EXTRACTION BLANK	SOURCE 1016. ext blk	PPB (One analyzed with this set)	STATUS
Benzene	Methanol	<1.0	ACCEPTABLE
Toluene	Methanol	<1.0	ACCEPTABLE
Ethyl benzene	Methanol	<1.0	ACCEPTABLE
Total Xylenes	Methanol	<3.0	ACCEPTABLE

Narrative: Acceptable.

Carryover contamination checks	SOURCE	NARRATIVE (None analyzed with this set)	STATUS
Benzene	Vial + Boiled Water	<1.0	NA
Toluene	Vial + Boiled Water	<1.0	NA
Ethyl benzene	Vial + Boiled Water	<1.0	NA
Total Xylenes	Vial + Boiled Water	<3.0	NA

Narrative:

SAMPLE ID METHANOL CHECK	SOURCE Lot # H18318	PPB (Not analyzed with this set)	STATUS
Benzene	MeOH/Boiled Water	<2.5	ACCEPTABLE
Toluene	MeOH/Boiled Water	<2.5	ACCEPTABLE
Ethyl benzene	MeOH/Boiled Water	<2.5	ACCEPTABLE
Total Xylenes	MeOH/Boiled Water	<7.5	ACCEPTABLE

Narrative: Acceptable.

Reported By:

Approved By:

Date: 12/2/96

EL PASO
FIELD SERVICES

DIVISION

November 13, 1996

Mr. Bill Olson
New Mexico Oil Conservation Division
2040 S. Pacheco
Santa Fe, NM 87505

RECEIVED
NOV 15 1996
Environmental Bureau
Oil Conservation Division

RE: San Juan River Plant Landfarm

Dear Mr. Olson:

As you are aware, during 1992, El Paso Field Services (EPFS) constructed a landfarm to remediate hydrocarbon contaminated soils excavated from the flare pits at the San Juan River Plant. The hydrocarbon concentrations in soils excavated from these pits ranged from 6,500 to 8,000 Mg/Kg.

The landfarm was constructed with four cells. Cells 3 and 4 reached the desired clean up levels in 1995, and are no longer active. The results from the most recent sampling on cells 1 and 2 are:

Sample Location	TPH Results - Mg/Kg
Cell 1-1	42
Cell 1-2	ND
Cell 1-3	76
Cell 1-3*	14
Cell 1-4	33
Cell 1-5	42
Cell 2-1	48
Cell 2-2	87
Cell 2-2*	17
Cell 2-3	33
Cell 2-4	50
Cell 2-5	51

* TPH results at 2 feet below ground surface. Also a field duplicate sample from Cell 2-3 tested to contain 29 Mg/Kg.

Analysis results on all samples are below the permitted action level of 100 Mg/Kg, and subsurface samples have always indicated no downward migration of the hydrocarbons. Therefore, EPFS is proposing to discontinue any further treatment or testing of the landfarm. After you have had opportunity to review the attached sample results, please let me know if you agree that the landfarm can now be closed without further activity.

If you need any additional information, please call me at (505) 599-2256.

Sincerely yours,

David Bays

David Bays, REM
Sr. Environmental Scientist

cc: Mr. Denny Foust, NMOCD - Aztec
S. D. Miller/R. D. Cosby/J. S. Sterrett/San Juan Plant file

American Environmental Network, Inc.

AEN I.D. 610383

October 29, 1996

EL PASO FIELD SERVICE CO.
P.O. BOX 4990
FARMINGTON, NM 87499

Project Name S.J. LANDFARM
Project Number (none)

Attention: JOHN LAMBDIN

On 10/24/96 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze **non-aq** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.

Kimberly D. McNeill
Project Manager

H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt

Enclosure

2709-D Pan American Freeway, NE • Albuquerque, NM 87107 • (505) 344-3777 • Fax (602) 344-4413

American Environmental Network, Inc.

CLIENT	: EL PASO FIELD SERVICE CO.	AEN I D.	: 610383
PROJECT #	: (none)	DATE RECEIVED	: 10/24/96
PROJECT NAME	: S.J. LANDFARM	REPORT DATE	: 10/29/96

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	960883 Cell #1-1	NON - AQUEOUS	10/23/96
02	960884 Cell #1-2	AQUEOUS	10/23/96
03	960885 Cell # 1-3	AQUEOUS	10/23/96
04	960886 Cell # 1-3 2' Subsurface	AQUEOUS	10/23/96
05	960887 Cell # 1-4	AQUEOUS	10/23/96
06	960888 Cell #1-5	AQUEOUS	10/23/96
07	960889 Cell # 2-1	AQUEOUS	10/23/96
08	960890 Cell # 2-2	AQUEOUS	10/23/96
09	960891 Cell # 2-2 2' Subsurface	AQUEOUS	10/23/96
10	960892 Cell # 2-3	AQUEOUS	10/23/96
11	960893 Cell # 2-3 DUPLICATE	AQUEOUS	10/23/96
12	960894 Cell # 2-4	AQUEOUS	10/23/96
13	960895 Cell #2 -5	NON - AQUEOUS	10/23/96

AVARAGE TPH (Modified 8015) Cell #1 = 39 mg/kg

AVERAGE TPH (Modified 8015) Cell #2 = 54 mg/kg

All Subsurface = Clean

JF

11/1/96

American Environmental Network, Inc.

GAS CHROMOTOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : EL PASO FIELD SERVICE CO.
AEN I.D.: 610383
PROJECT # : (none)
PROJECT NAME : S.J. LANDFARM

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
01	960883	NON-AQ	10/23/96	10/25/96	10/25/96	1
02	960884	NON-AQ	10/23/96	10/25/96	10/25/96	1
03	960885	NON-AQ	10/23/96	10/25/96	10/25/96	1

PARAMETER	DET. LIMIT	UNITS	01	02	03
FUEL HYDROCARBONS, C6-C10	10	MG/KG	< 10	< 10	< 10
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	**17**	< 5.0	**22**
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	**25**	< 5.0	**54**
CALCULATED SUM:			**42**		**76**
SURROGATE:					
O-TERPHENYL (%)			91	91	90
SURROGATE LIMITS	(66 - 151)				
			Cell #1-1	Cell #1-2	Cell #1-3

CHEMIST NOTES:
N/A

American Environmental Network, Inc.

GAS CHROMOTOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : EL PASO FIELD SERVICE CO. AEN I.D.: 610383
PROJECT # : (none)
PROJECT NAME : S.J. LANDFARM

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
04	960886	NON-AQ	10/23/96	10/25/96	10/25/96	1
05	960887	NON-AQ	10/23/96	10/25/96	10/25/96	1
06	960888	NON-AQ	10/23/96	10/25/96	10/25/96	1

PARAMETER	DET. LIMIT	UNITS	04	05	06
FUEL HYDROCARBONS, C6-C10	10	MG/KG	< 10	< 10	< 10
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	< 5.0	**14**	**12**
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	**14**	**19**	**30**
CALCULATED SUM:			**14**	**33**	**42**
SURROGATE:					
O-TERPHENYL (%)			93	91	90
SURROGATE LIMITS	(66 - 151)				
			Cell #1-3 2' Subsurface	Cell #1-4	Cell #1-5

CHEMIST NOTES:
N/A

American Environmental Network, Inc.

GAS CHROMOTOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : EL PASO FIELD SERVICE CO. AEN I.D.: 610383
PROJECT # : (none)
PROJECT NAME : S.J. LANDFARM

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
07	960889	NON-AQ	10/23/96	10/25/96	10/25/96	1
08	960890	NON-AQ	10/23/96	10/25/96	10/25/96	1
09	960891	NON-AQ	10/23/96	10/25/96	10/25/96	1

PARAMETER	DET. LIMIT	UNITS	07	08	09
FUEL HYDROCARBONS, C6-C10	10	MG/KG	< 10	< 10	< 10
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	**13**	**23**	< 5.0
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	**35**	**64**	**17**
CALCULATED SUM:			**48**	**87**	**17**
SURROGATE:					
O-TERPHENYL (%)			90	91	92
SURROGATE LIMITS	(66 - 151)				
			Cell #2-1	Cell #2-2	Cell #2-2 2' Subsurface

CHEMIST NOTES:
N/A

American Environmental Network, Inc.

GAS CHROMOTOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : EL PASO FIELD SERVICE CO. AEN I.D.: 610383
PROJECT # : (none)
PROJECT NAME : S.J. LANDFARM

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
10	960892	NON-AQ	10/23/96	10/25/96	10/25/96	1
11	960893	NON-AQ	10/23/96	10/25/96	10/25/96	1
12	960894	NON-AQ	10/23/96	10/25/96	10/25/96	1

PARAMETER	DET. LIMIT	UNITS	10	11	12
FUEL HYDROCARBONS, C6-C10	10	MG/KG	< 10	< 10	< 10
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	**12**	**12**	**11**
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	**21**	**17**	**39**
CALCULATED SUM:			**33**	**29**	**50**
SURROGATE:					
O-TERPHENYL (%)			90	93	93
SURROGATE LIMITS	(66 - 151)				
			Cell # 2-3	Cell #2-3 Field Duplicate	Cell #2-4

CHEMIST NOTES:

GAS CHROMOTOGRAPHY RESULTS

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
CLIENT : EL PASO FIELD SERVICE CO.
AEN I.D.: 610383
PROJECT # : (none)
PROJECT NAME : S.J. LANDFARM

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
13	960895	NON-AQ	10/23/96	10/25/96	10/25/96	1

PARAMETER	DET. LIMIT	UNITS	13
FUEL HYDROCARBONS, C6-C10	10	MG/KG	< 10
FUEL HYDROCARBONS, C10-C22	5.0	**MG/KG**	**16**
FUEL HYDROCARBONS, C22-C36	5.0	**MG/KG**	**35**
CALCULATED SUM:			**51**
SURROGATE:			
O-TERPHENYL (%)			90
SURROGATE LIMITS	(66 - 151)		

Cell #2-5

CHEMIST NOTES:
N/A

American Environmental Network, Inc.

GAS CHROMOTOGRAPHY RESULTS
REAGENT BLANK

TEST	: EPA 8015 MODIFIED (DIRECT INJECT)		
BLANK I.D.	: 102596	AEN I.D.	: 610383
CLIENT	: EL PASO FIELD SERVICE CO.	DATE EXTRACTED	: 10/25/96
PROJECT #	: (none)	DATE ANALYZED	: 10/25/96
PROJECT NAME	: S.J. LANDFARM	SAMPLE MATRIX	: NON-AQ

PARAMETER	UNITS	
FUEL HYDROCARBONS, C6-C10	MG/KG	< 10
FUEL HYDROCARBONS, C10-C22	MG/KG	< 5.0
FUEL HYDROCARBONS, C22-C36	MG/KG	< 5.0

SURROGATE:

O-TERPHENYL (%)		91
SURROGATE LIMITS	(80 - 151)	

CHEMIST NOTES:
N/A

Acceptable.

11/1/96

American Environmental Network, Inc.

GAS CHROMOTOGRAPHY QUALITY CONTROL
MSMSD

TEST : EPA 8015 MODIFIED (DIRECT INJECT)
MSMSD # : 610371-01
CLIENT : EL PASO FIELD SERVICE CO.
PROJECT # : (none)
PROJECT NAME : S.J. LANDFARM

AEN I.D. : 610383
DATE EXRACTED : 10/22/96
DATE ANALYZED : 10/22/96
SAMPLE MATRIX : NON-AQ
UNITS : MG/KG

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD	REC LIMITS	RPD LIMITS
FUEL HYDROCARBONS	<5.0	100	94	94	96	96	2	(56 - 148)	20

CHEMIST NOTES:
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result - Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result - Duplicate Result})}{\text{Average Result}} \times 100$$

Acceptable

11/1/96

American Environmental Network (NM), Inc.
Albuquerque • Phoenix • Pensacola • Portland • Pleasant Hills • Columbia

CHAIN OF CUSTODY

DATE: 10-23-96 PAGE: 1 OF 2

AEN LAB I.D. 610383

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: JOHN LAMBDIN
COMPANY: EL PASO FIELD SERVICE
ADDRESS: P.O. BOX 4990
FARMINGTON, N.M. 87499
PHONE: (505) 599-2144
FAX: (505) 599-2261
BILL TO: SAME AS ABOVE
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct/Inject		(M8015) Gas/Purge & Trap	Gasoline/BTEX & MTBE (M8015/8020)	BTXE/MTBE (8020)	BTEX & Chlorinated Aromatics (602/8020)	BTEX/MTBE/EDC & EDB (8020/8010/Short)	Chlorinated Hydrocarbons (601/8010)		504 EDB ☐ / DBCP ☐	Polynuclear Aromatics (610/8310)	Volatile Organics (624/8240) GC/MS	Volatile Organics (8260) GC/MS		Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)		General Chemistry:			Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:		NUMBER OF CONTAINERS
960883	10-23-96	1040	Soil	-01		X																											1
960884	10-23-96	1046	Soil	-02		X																											1
960885	10-23-96	1053	Soil	-03		X																											1
960886	10-23-96	1107	Soil	-04		X																											1
960887	10-23-96	1118	Soil	-05		X																											1
960888	10-23-96	1126	Soil	-06		X																											1
960889	10-23-96	1142	Soil	-07		X																											1
960890	10-23-96	1150	Soil	-08		X																											1
960891	10-23-96	1153	Soil	-09		X																											1
960892	10-23-96	1158	Soil	-10		X																											1

PROJECT INFORMATION

PROJ. NO.:
PROJ. NAME: S.J. LANDFARM
P.O. NO.:
SHIPPED VIA: FED-X

SAMPLE RECEIPT

NO. CONTAINERS	10
CUSTODY SEALS	Y/N/[✓ NA]
RECEIVED INTACT	YES
[✓ BLUE ICE/ICE]	5°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

RELINQUISHED BY: 1.
Signature: Dennis Bird Time: 1434
Printed Name: DENNIS BIRD Date: 10-23-96
Company: EL PASO FIELD SERVICE

RELINQUISHED BY: 2.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: 1.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: (LAB) 2.
Signature: John Caldwell Time: 1120
Printed Name: John Caldwell Date: 10/24/96
American Environmental Network (NM), Inc.

4/1/96 AEN Inc.: American Environmental Network (NM), Inc. • 2709-D Pan American Freeway, NE • Albuquerque, New Mexico 87107

DISTRIBUTION: White, Canary - AEN Pink - ORIGINATOR

American Environmental Network (NM), Inc.
Albuquerque • Phoenix • Pensacola • Portland • Pleasant Hills • Columbia

CHAIN OF CUSTODY

DATE: 10-23-96 PAGE: 2 OF 2

AEN LAB I.D. 610383

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: JOHN LAMBDIN

COMPANY: EL PASO FIELD SERVICE
ADDRESS: P.O. BOX 4990
FARMINGTON N.M. 87499
PHONE: (505) 599-2144
FAX: (505) 599-2261
BILL TO: SAME AS ABOVE
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct/Inject		(M8015) Gas/Purge & Trap	Gasoline/BTEX & MTBE (M8015/8020)	BTXE/MTBE (8020)	BTEX & Chlorinated Aromatics (602/8020)	BTEX/MTBE/EDC & EDB (8020/8010/Short)	Chlorinated Hydrocarbons (601/8010)		504 EDB ☐ / DBCP ☐	Polynuclear Aromatics (610/8310)	Volatile Organics (624/8240) GC/MS	Volatile Organics (8260) GC/MS		Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)		General Chemistry:			Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals:		NUMBER OF CONTAINERS
960893	10-23-96	1156	soil	-11		X																											1
960894	10-23-96	1205	soil	-12		X																											1
960895	10-23-96	1212	soil	-13		X																											1

PROJECT INFORMATION

PROJ. NO.:
PROJ. NAME: S.J. GROUNDWATER
P.O. NO.:
SHIPPED VIA: FED-X

SAMPLE RECEIPT

NO. CONTAINERS	3
CUSTODY SEALS	Y / N / [✓ NA]
RECEIVED INTACT	Yes
[✓ BLUE ICE]/ICE	5°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) [ ] 24hr [ ] 48hr [ ] 72hr [ ] 1 WEEK (NORMAL) ☒
CERTIFICATION REQUIRED: [ ] NM [ ] SDWA [ ] OTHER
METHANOL PRESERVATION [ ]
COMMENTS: FIXED FEE [ ]

RELINQUISHED BY: 1.
Signature: Dennis Bird Time: 1438
Printed Name: DENNIS BIRD Date: 10-23-96
Company: EL PASO FIELD SERVICE

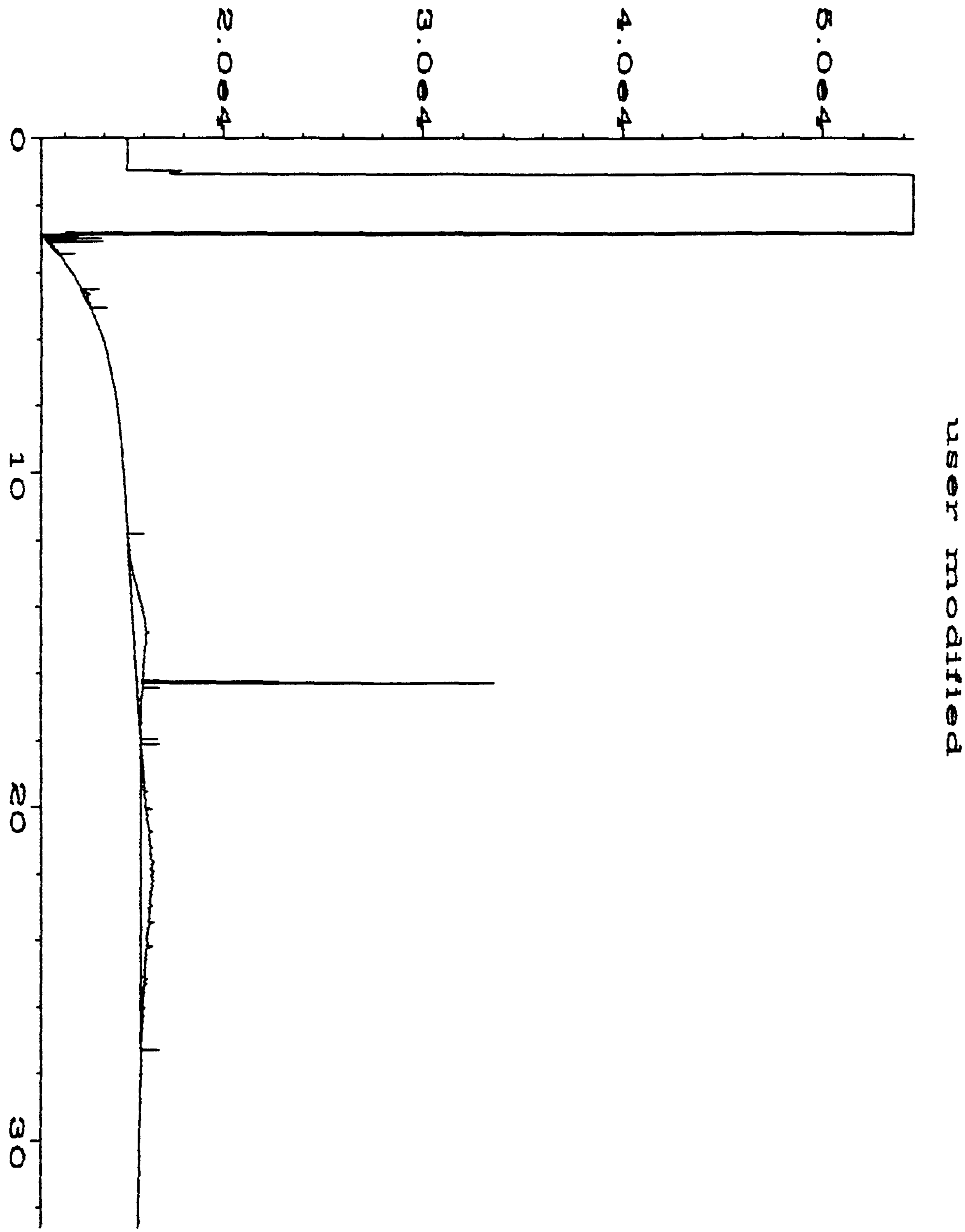
RELINQUISHED BY: 2.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: 1.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: (LAB) 2.
Signature: John Caldwell Time: 1120
Printed Name: John Caldwell Date: 10/23/96
American Enviromental Network (NM), Inc.

4/1/96 AEN Inc.: American Environmental Network (NM), Inc. • 2709-D Pan American Freeway, NE • Albuquerque, New Mexico 87107

DISTRIBUTION: White, Canary - AEN Pink - ORIGINATOR



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Data File Name    : C:\HPCHEM\1\DATA\25OCT96\005F0301.D
Operator          : AEN NM GC #1 FID DI            Page Number        : 1
Instrument        : GC#1 5890                      Vial Number        : 5
Sample Name       : 610383-01                      Injection Number   : 1
Run Time Bar Code:                                 Sequence Line      : 3
Acquired on       : 25 Oct 96   01:19 PM           Instrument Method: SDF0613.MTH
Report Created on: 28 Oct 96   02:08 PM            Analysis Method    : RTBRKDN2.MTH
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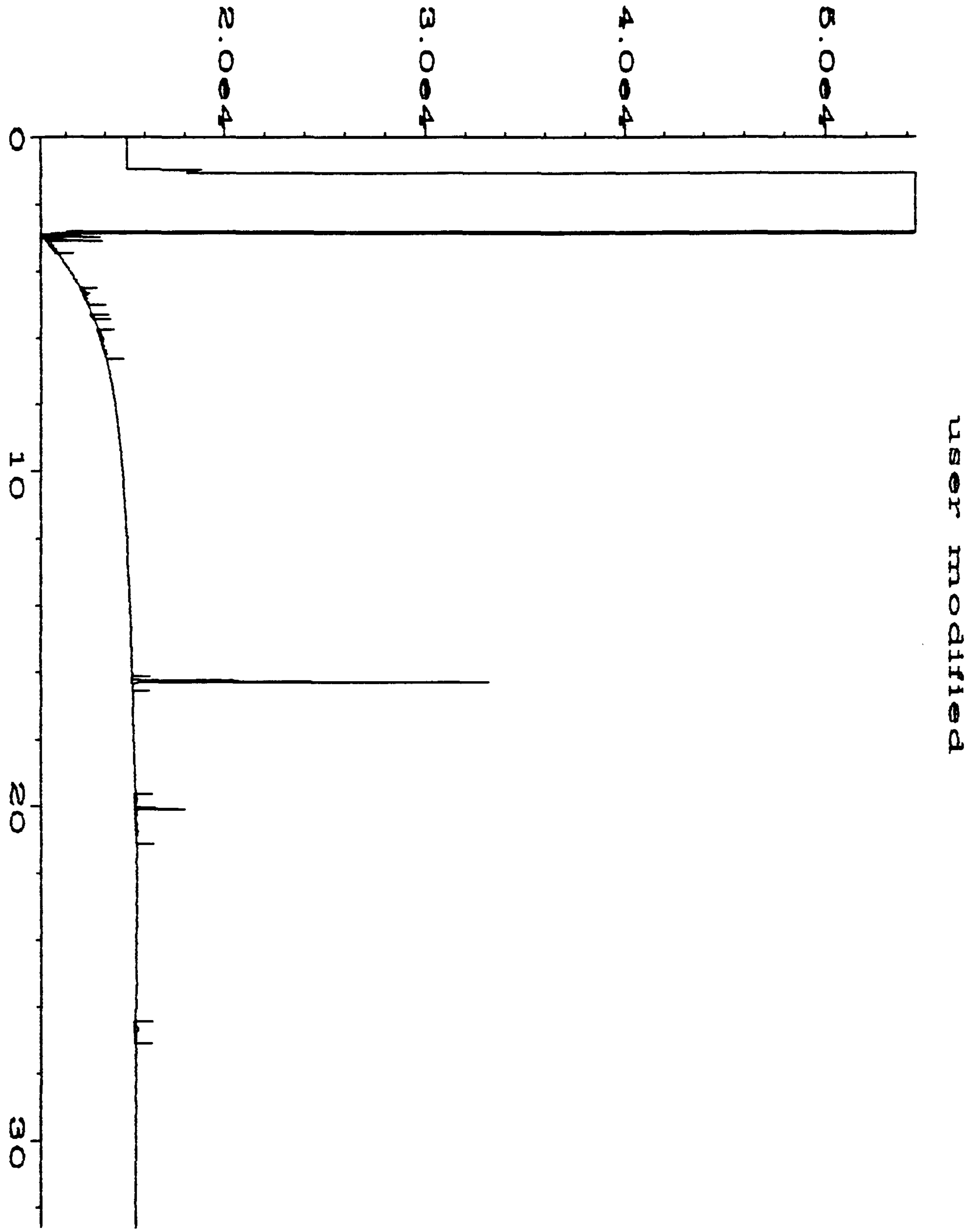

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Data File Name    : C:\HPCHEM\1\DATA\25OCT96\006F0301.D
Operator          : AEN NM GC #1 FID DI              Page Number       : 1
Instrument        : GC#1 5890                        Vial Number       : 6
Sample Name       : 610383-02                        Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 3
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Report Created on: 28 Oct 96   02:12 PM              Analysis Method   : RTBRKDN2.MTH
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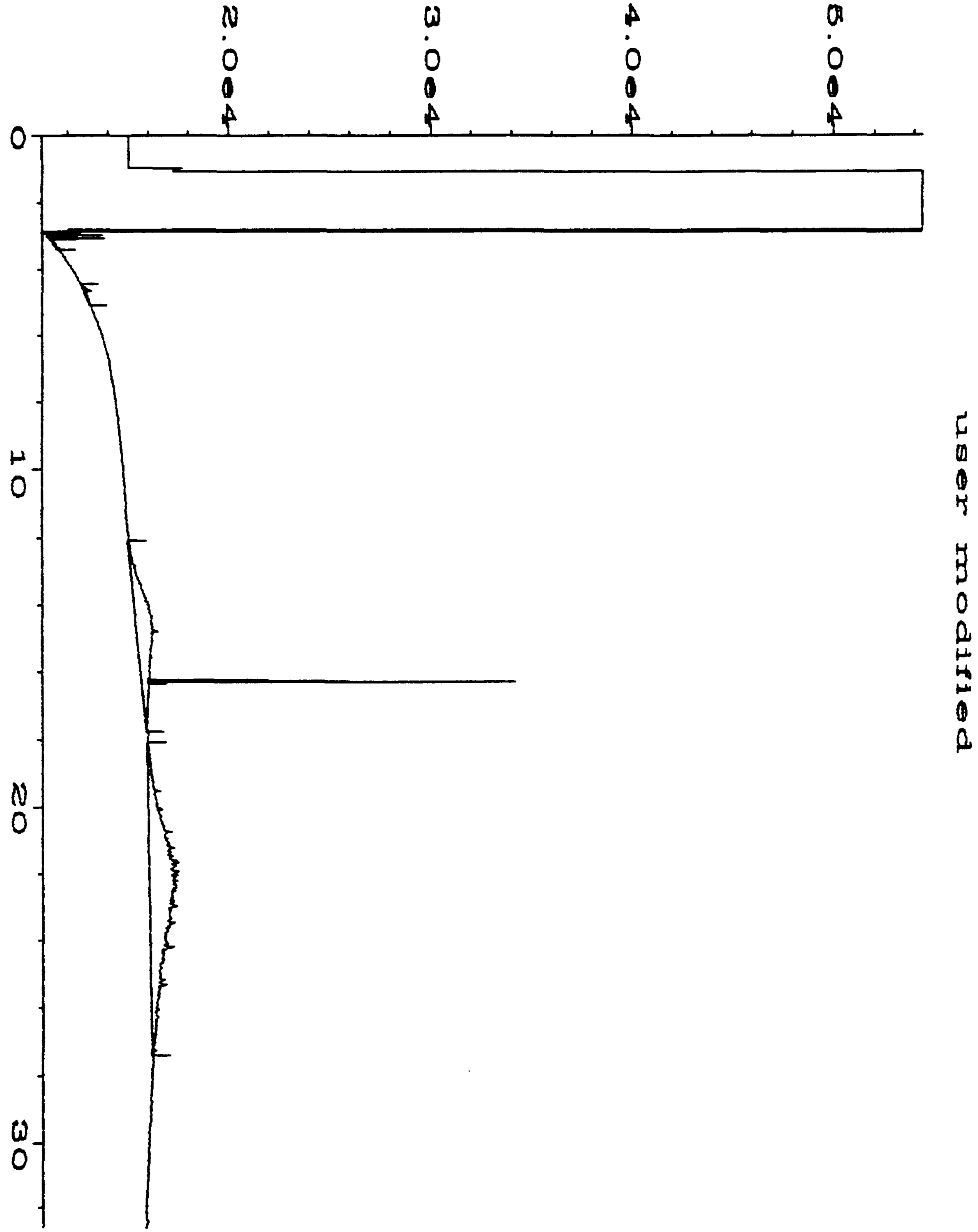

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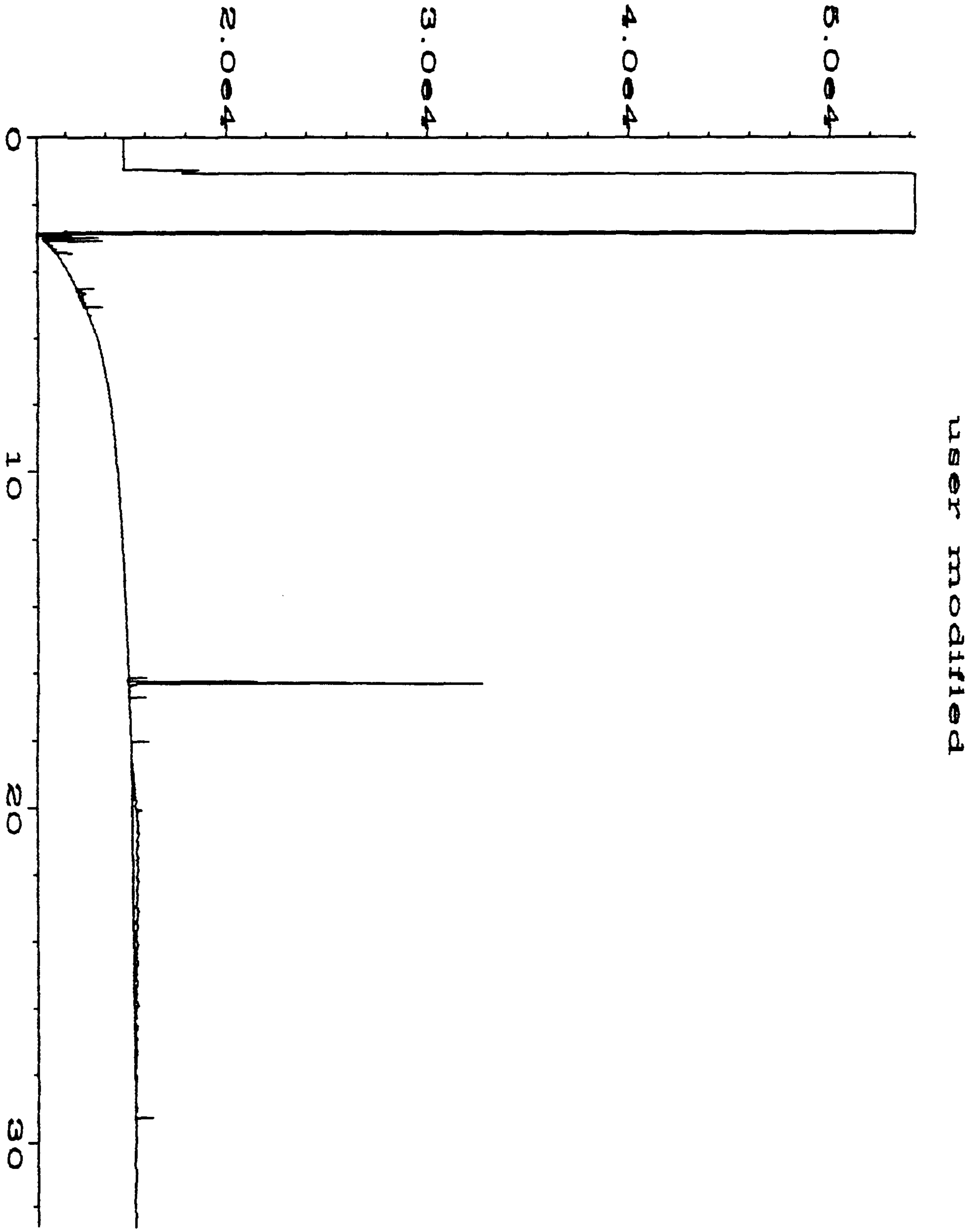
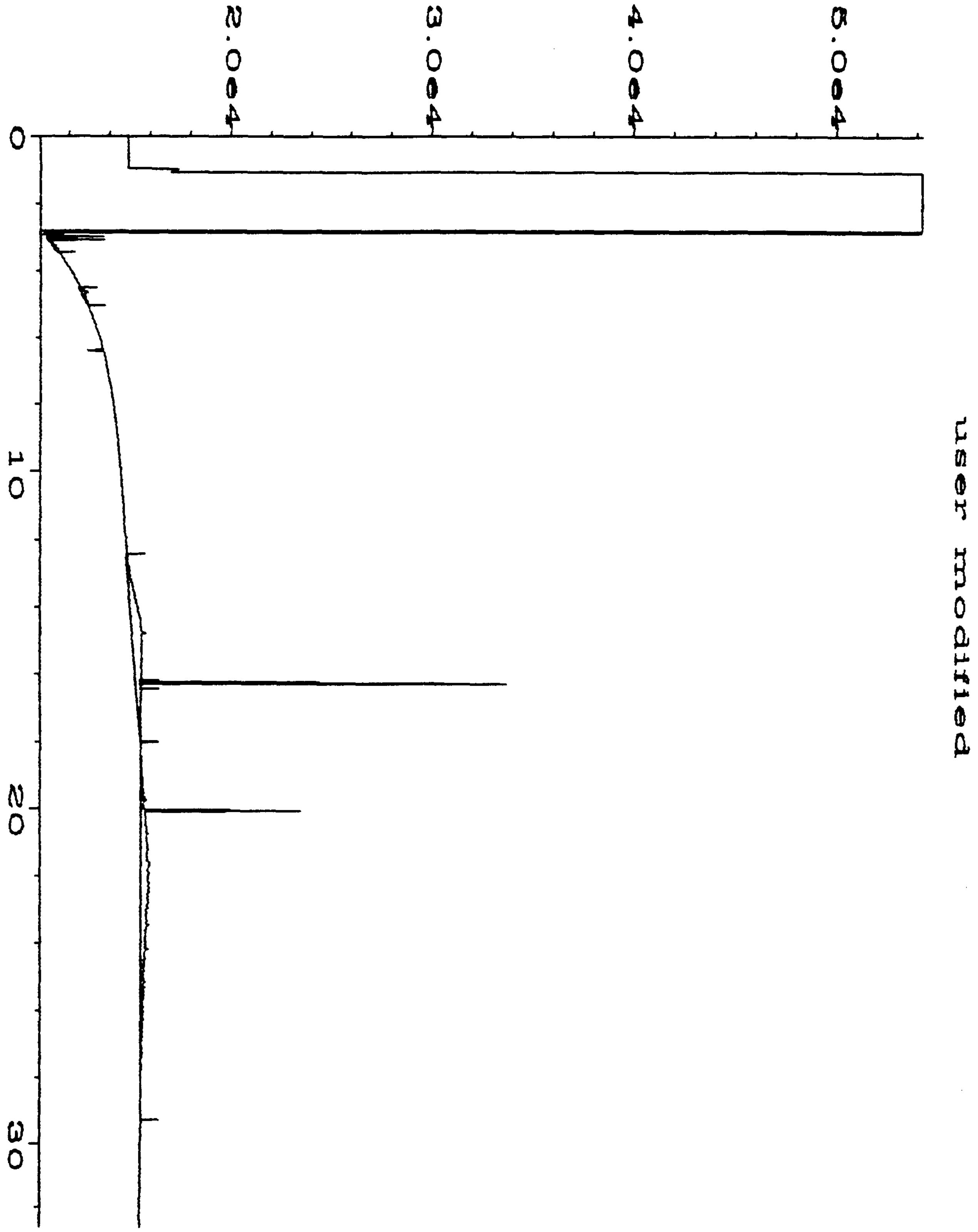
Data File Name    : C:\HPCHEM\1\DATA\25OCT96\007F0301.D
Operator          : AEN NM GC #1 FID DI            Page Number       : 1
Instrument        : GC#1 5890                      Vial Number       : 7
Sample Name       : 610383-03                      Injection Number  : 1
Run Time Bar Code:                                 Sequence Line     : 3
Acquired on       : 25 Oct 96  02:52 PM            Instrument Method: SDF0613.MTH
Report Created on: 28 Oct 96  02:20 PM             Analysis Method   : RTBRKDN2.MTH
```



Data File Name	: C:\HPCHEM\1\DATA\25OCT96\008F0301.D		
Operator	: AEN NM GC #1 FID DI	Page Number	: 1
Instrument	: GC#1 5890	Vial Number	: 8
Sample Name	: 610383-04	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 3
Acquired on	: 25 Oct 96 03:38 PM	Instrument Method:	SDF0613.MTH
Report Created on:	28 Oct 96 02:22 PM	Analysis Method	: RTBRKDN2.MTH



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Data File Name    : C:\HPCHEM\1\DATA\25OCT96\009F0301.D
Operator          : AEN NM GC #1 FID DI           Page Number       : 1
Instrument        : GC#1 5890                     Vial Number       : 9
Sample Name       : 610383-05                     Injection Number  : 1
Run Time Bar Code:                                Sequence Line     : 3
Acquired on       : 25 Oct 96  04:25 PM           Instrument Method: SDF0613.MTH
Report Created on: 28 Oct 96  02:25 PM            Analysis Method   : RTBRKDN2.MTH
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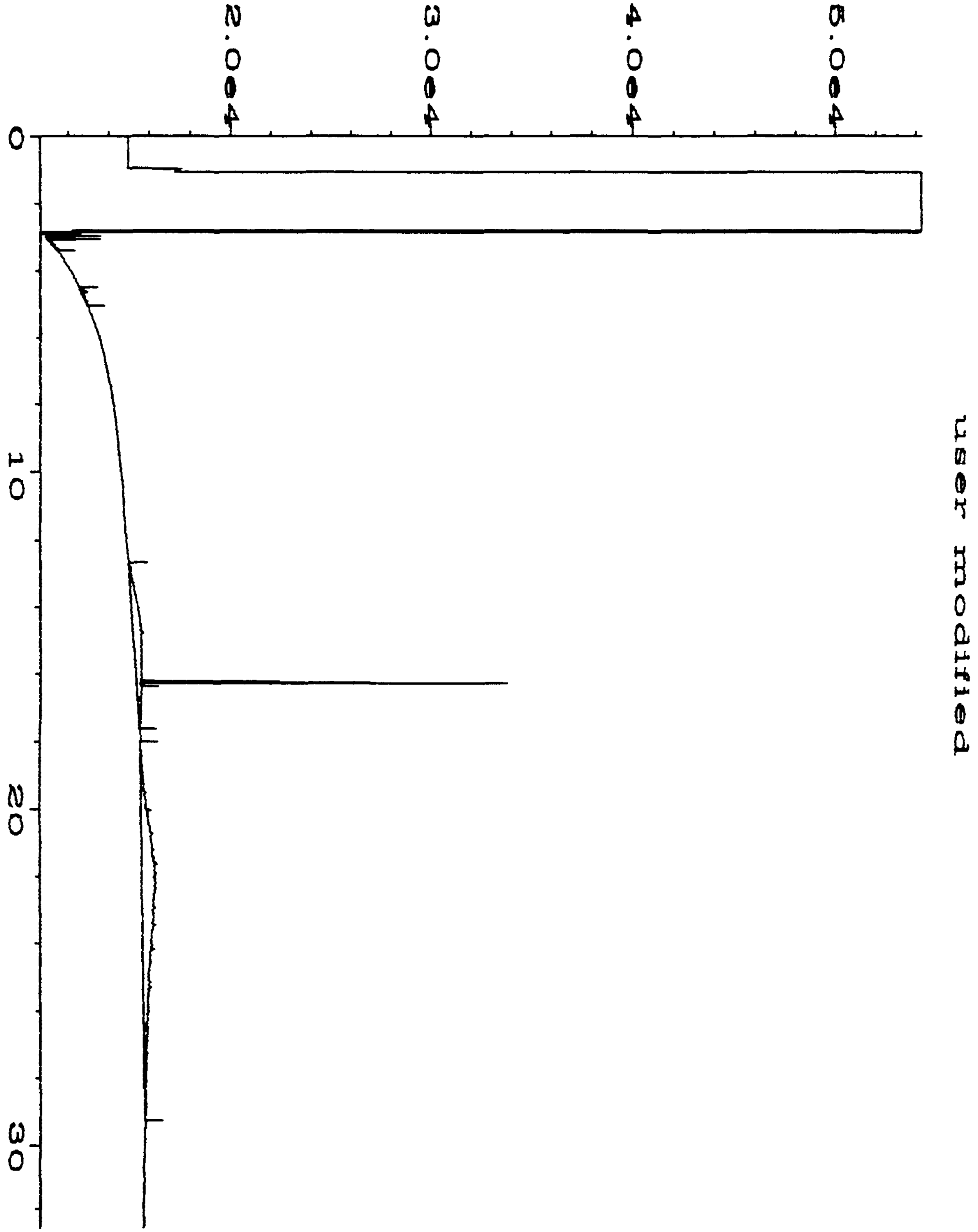
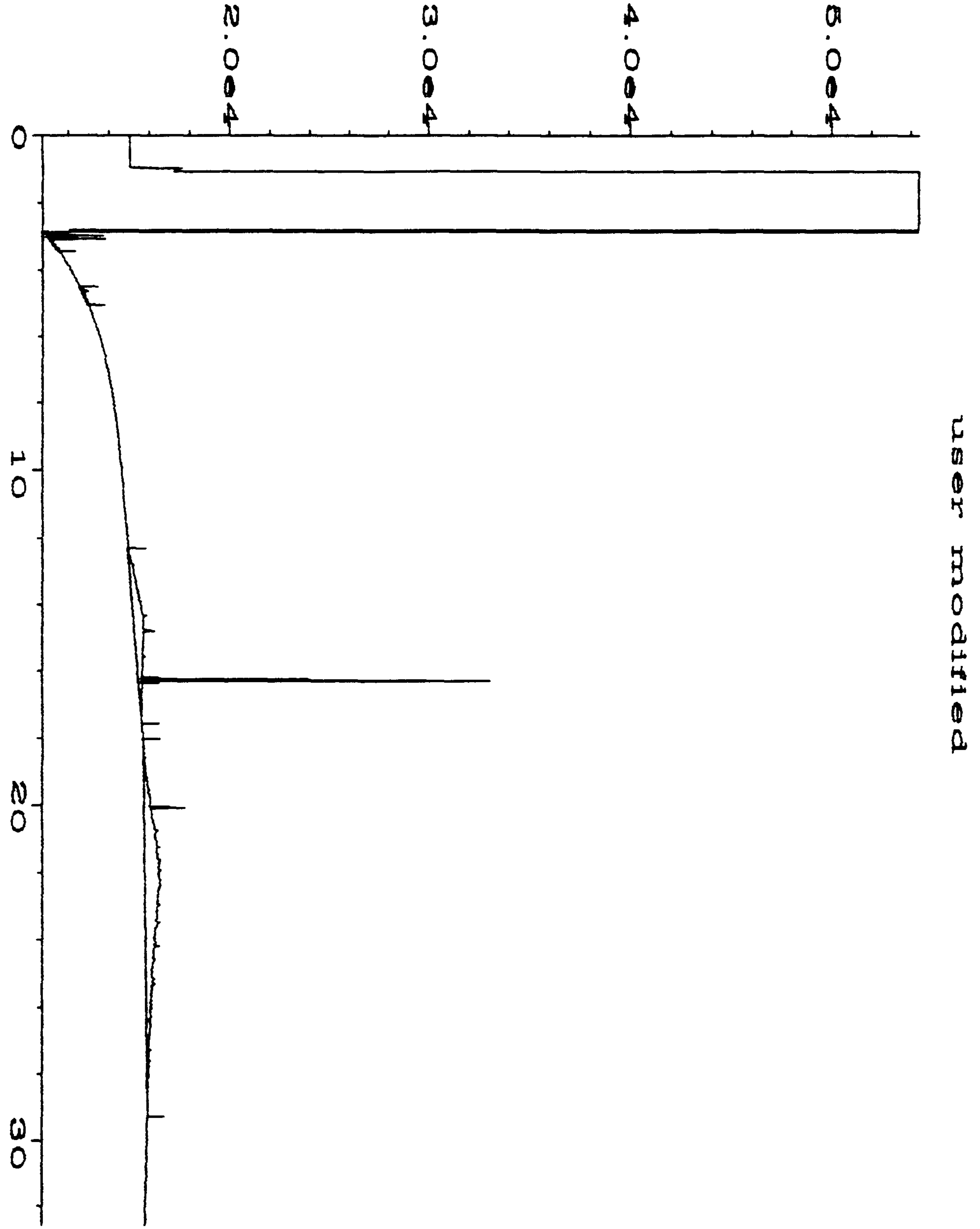


Data File Name : C:\HPCHEM\1\DATA\25OCT96\010F0301.D
Operator : AEN NM GC #1 FID DI
Instrument : GC#1 5890
Sample Name : 610383-06
Run Time Bar Code:
Acquired on : 25 Oct 96 05:13 PM
Report Created on: 28 Oct 96 02:29 PM

Page Number : 1
Vial Number : 10
Injection Number : 1
Sequence Line : 3
Instrument Method: SDF0613.MTH
Analysis Method : RTBRKDN2.MTH



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Data File Name    : C:\HPCHEM\1\DATA\25OCT96\011F0301.D
Operator          : AEN NM GC #1 FID DI            Page Number      : 1
Instrument        : GC#1 5890                      Vial Number      : 11
Sample Name       : 610383-07                      Injection Number : 1
Run Time Bar Code:                                 Sequence Line    : 3
Acquired on       : 25 Oct 96  06:00 PM            Instrument Method: SDF0613.MTH
Report Created on: 28 Oct 96  02:32 PM             Analysis Method  : RTBRKDN2.MTH
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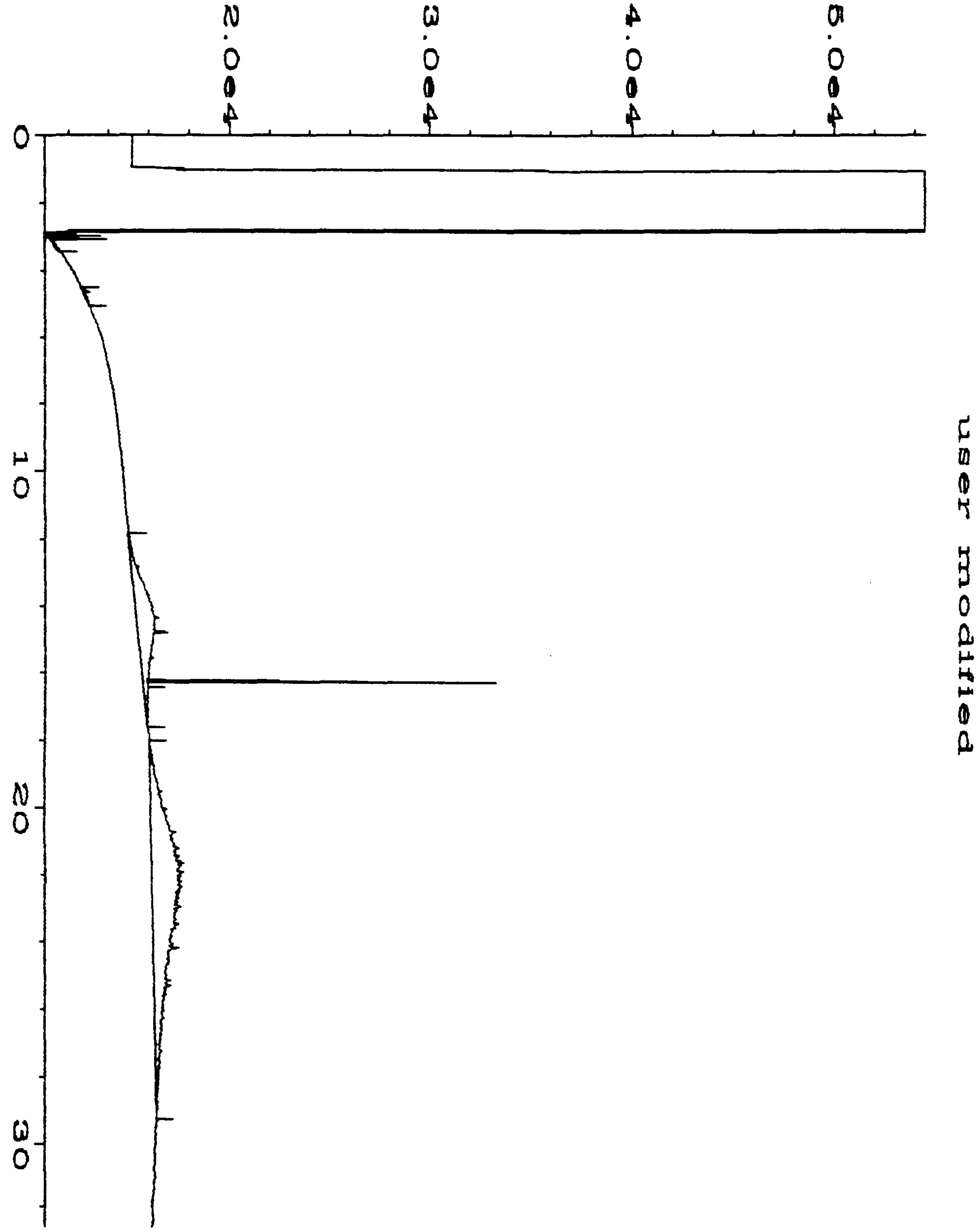

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Data File Name    : C:\HPCHEM\1\DATA\25OCT96\012F0301.D
Operator          : AEN NM GC #1 FID DI           Page Number      : 1
Instrument        : GC#1 5890                     Vial Number      : 12
Sample Name       : 610383-08                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 3
Acquired on       : 25 Oct 96  06:46 PM           Instrument Method: SDF0613.MTH
Report Created on: 28 Oct 96  02:34 PM            Analysis Method  : RTBRKDN2.MTH
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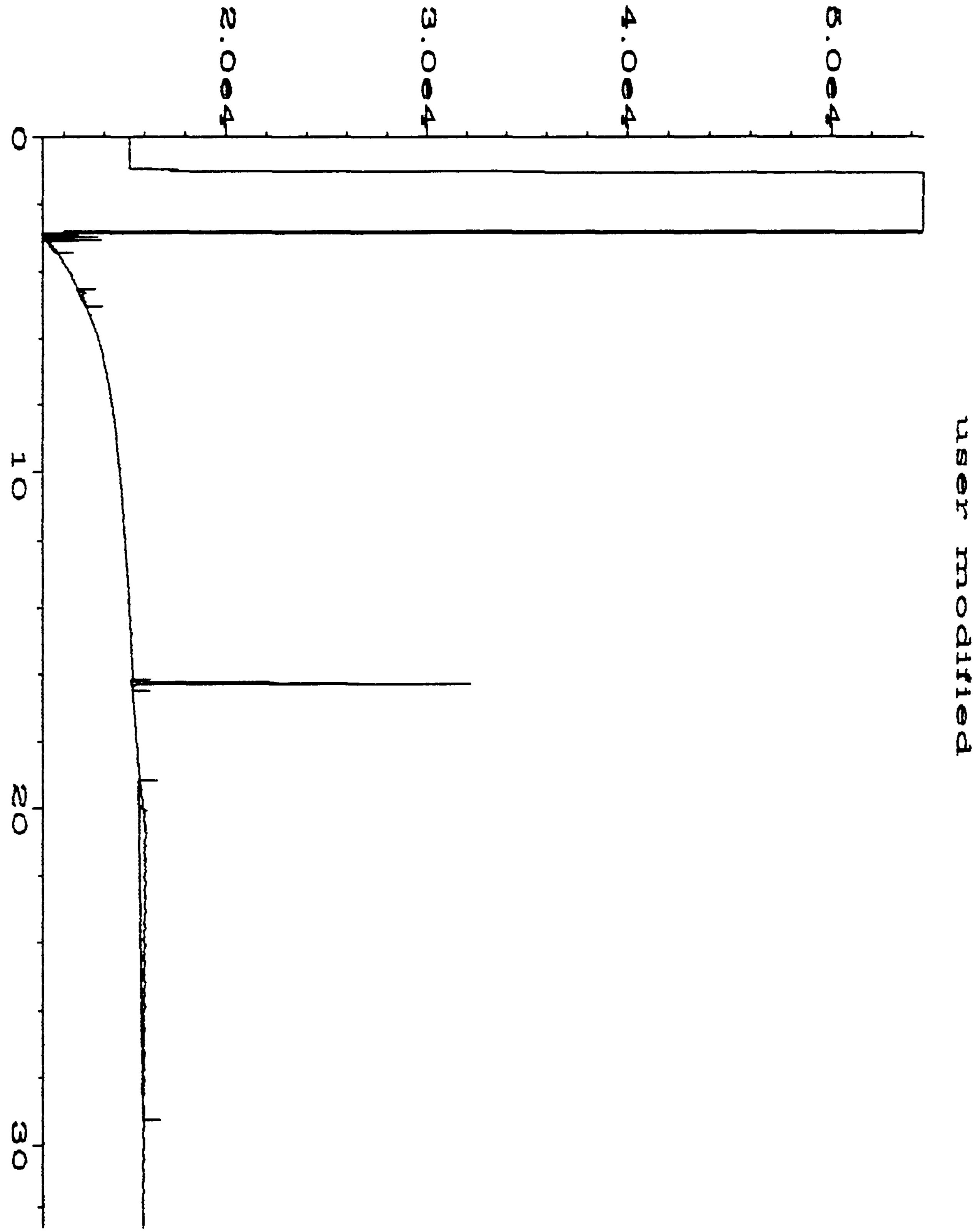

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Data File Name    : C:\HPCHEM\1\DATA\25OCT96\013F0301.D
Operator          : AEN NM GC #1 FID DI              Page Number       : 1
Instrument        : GC#1 5890                        Vial Number       : 13
Sample Name       : 610383-09                        Injection Number  : 1
Run Time Bar Code:                                   Sequence Line     : 3
Acquired on       : 25 Oct 96   07:33 PM             Instrument Method: SDF0613.MTH
Report Created on: 28 Oct 96   02:37 PM              Analysis Method   : RTBRKDN2.MTH
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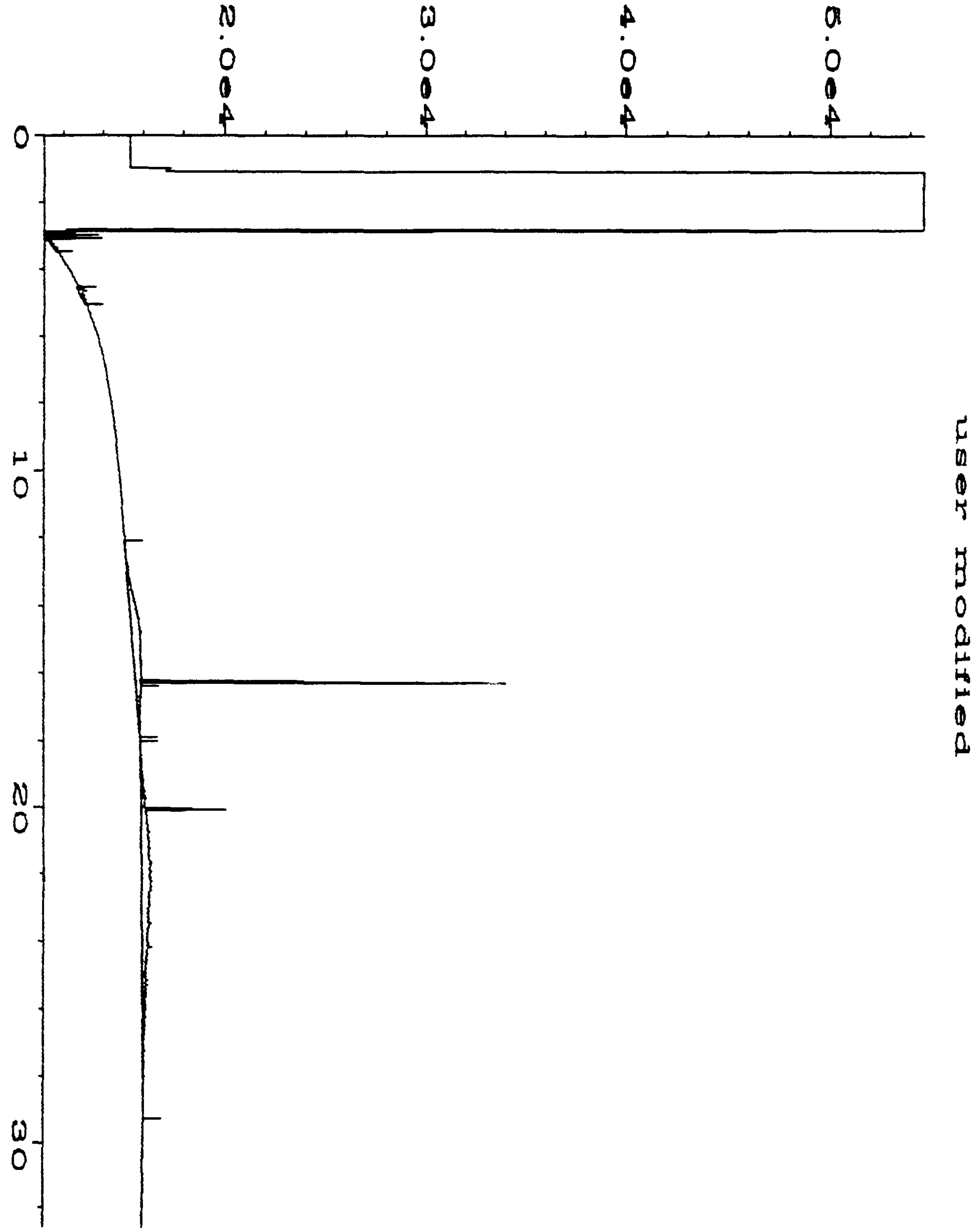

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Data File Name    : C:\HPCHEM\1\DATA\25OCT96\014F0301.D
Operator          : AEN NM GC #1 FID DI            Page Number       : 1
Instrument        : GC#1 5890                      Vial Number       : 14
Sample Name       : 610383-10                      Injection Number  : 1
Run Time Bar Code:                                 Sequence Line     : 3
Acquired on       : 25 Oct 96   08:19 PM           Instrument Method: SDF0613.MTH
Report Created on: 28 Oct 96   02:40 PM            Analysis Method   : RTBRKDN2.MTH
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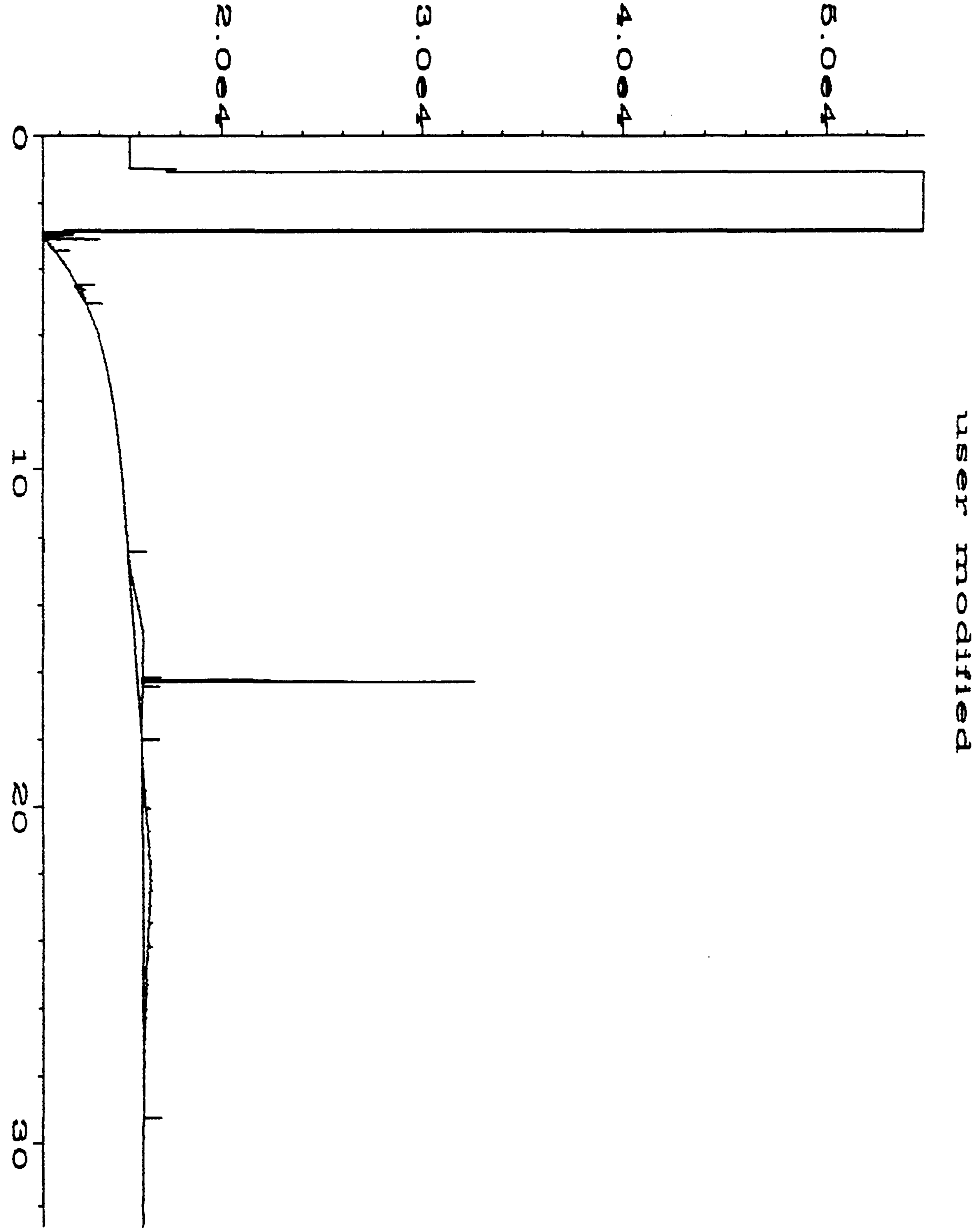
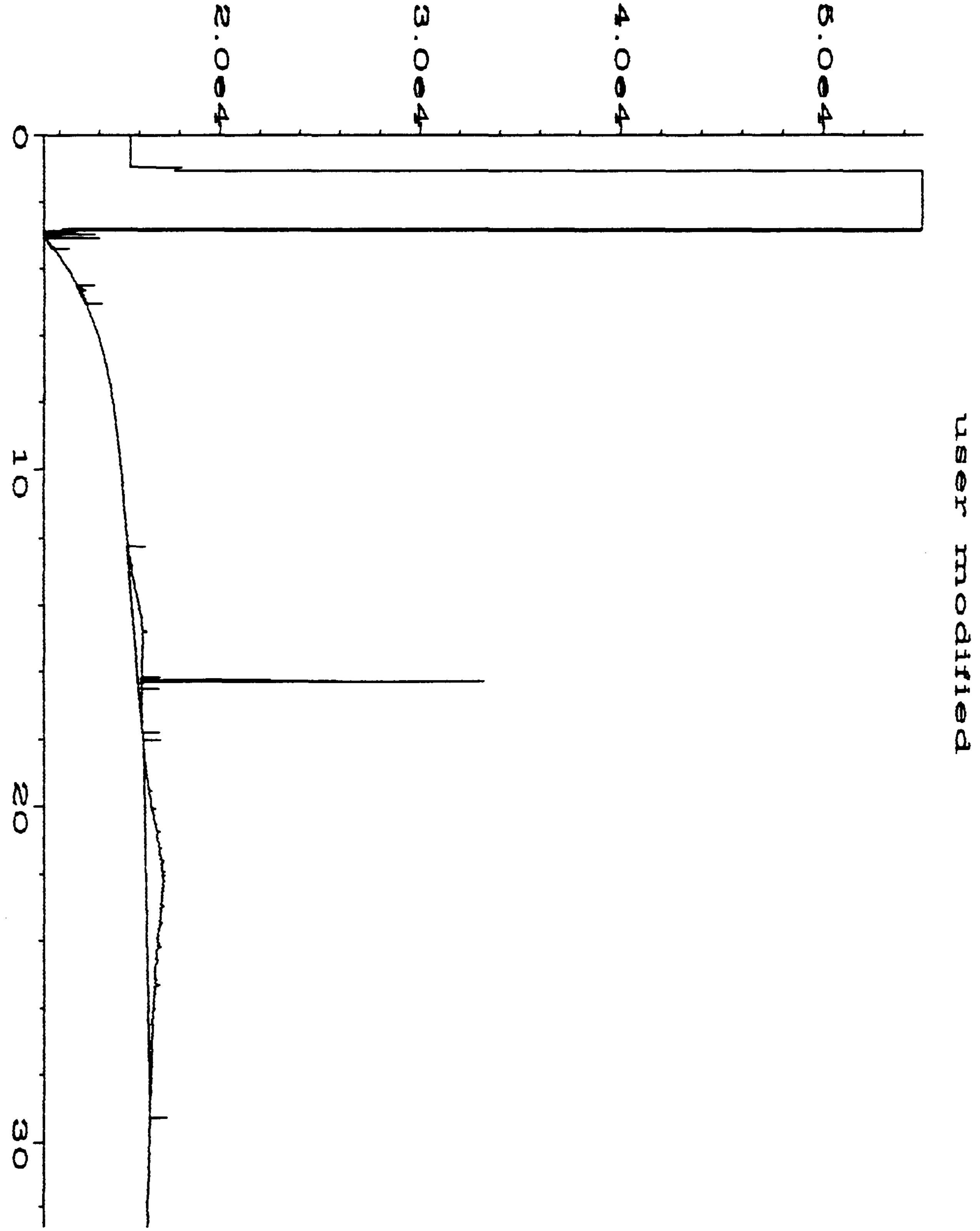


Data File Name   : C:\HPCHEM\1\DATA\25OCT96\016F0301.D
Operator   : AEN NM GC #1 FID DI
Instrument   : GC#1 5890
Sample Name   : 610383-11
Run Time Bar Code:
Acquired on   : 25 Oct 96   09:50 PM
Report Created on: 28 Oct 96   02:47 PM

Page Number   : 1
Vial Number   : 16
Injection Number : 1
Sequence Line   : 3
Instrument Method: SDF0613.MTH
Analysis Method   : RTBRKDN2.MTH



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Data File Name    : C:\HPCHEM\1\DATA\25OCT96\017F0301.D
Operator          : AEN NM GC #1 FID DI           Page Number      : 1
Instrument        : GC#1 5890                     Vial Number      : 17
Sample Name       : 610383-12                     Injection Number : 1
Run Time Bar Code:                                Sequence Line    : 3
Acquired on       : 25 Oct 96  10:35 PM           Instrument Method: SDF0613.MTH
Report Created on: 28 Oct 96  02:51 PM            Analysis Method  : RTBRKDN2.MTH
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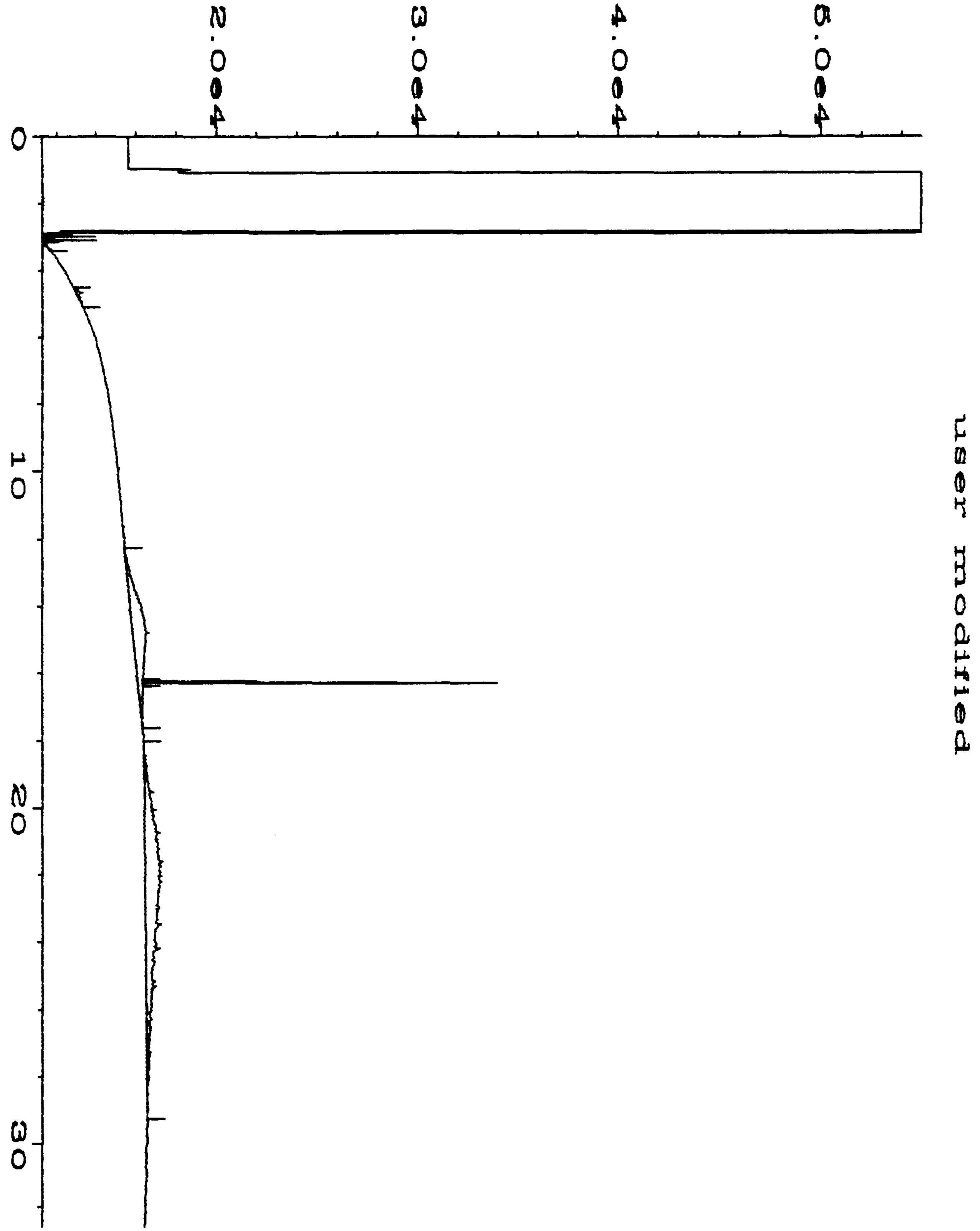
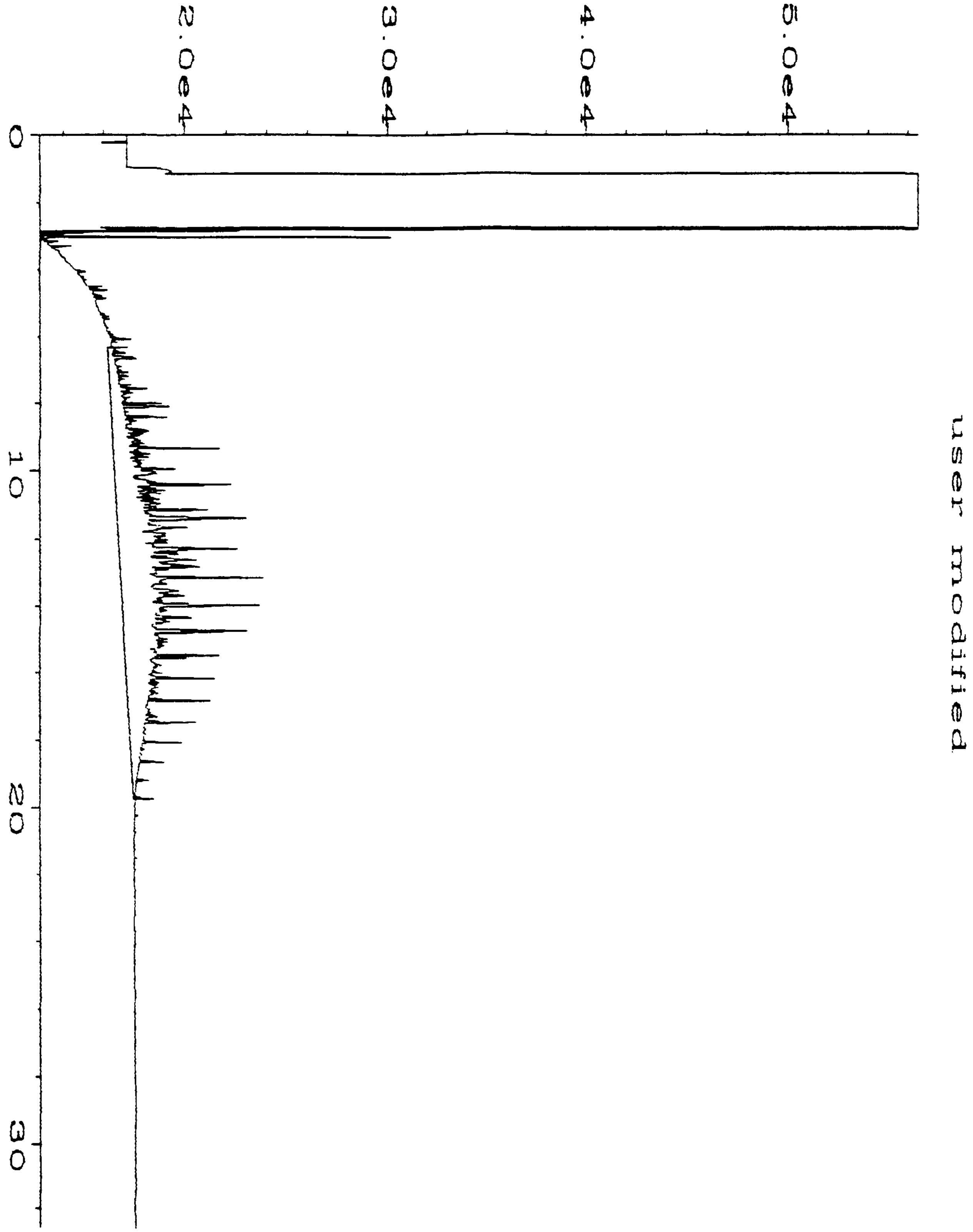


```
Data File Name    : C:\HPCHEM\1\DATA\25OCT96\018F0301.D
Operator          : AEN NM GC #1 FID DI         Page Number      : 1
Instrument        : GC#1 5890                   Vial Number      : 18
Sample Name       : 610383-13                   Injection Number : 1
Run Time Bar Code:                              Sequence Line    : 3
Acquired on       : 25 Oct 96   11:21 PM        Instrument Method: SDF0613.MTH
Report Created on: 28 Oct 96   02:54 PM         Analysis Method  : RTBRKDN2.MTH
```



```
Data File Name    : C:\HPCHEM\1\DATA\30SEP96\003F0101.D
Operator          : MC & JE                            Page Number       : 1
Instrument        : GC#1 5890                          Vial Number       : 3
Sample Name       : G23-96-06 DSL                      Injection Number  : 1
Run Time Bar Code:                                     Sequence Line     : 1
Acquired on       : 30 Sep 96  03:18 PM                Instrument Method: SDF0813.MTH
Report Created on: 01 Oct 96  09:08 AM                 Analysis Method  : RTBRKDN1.MTH
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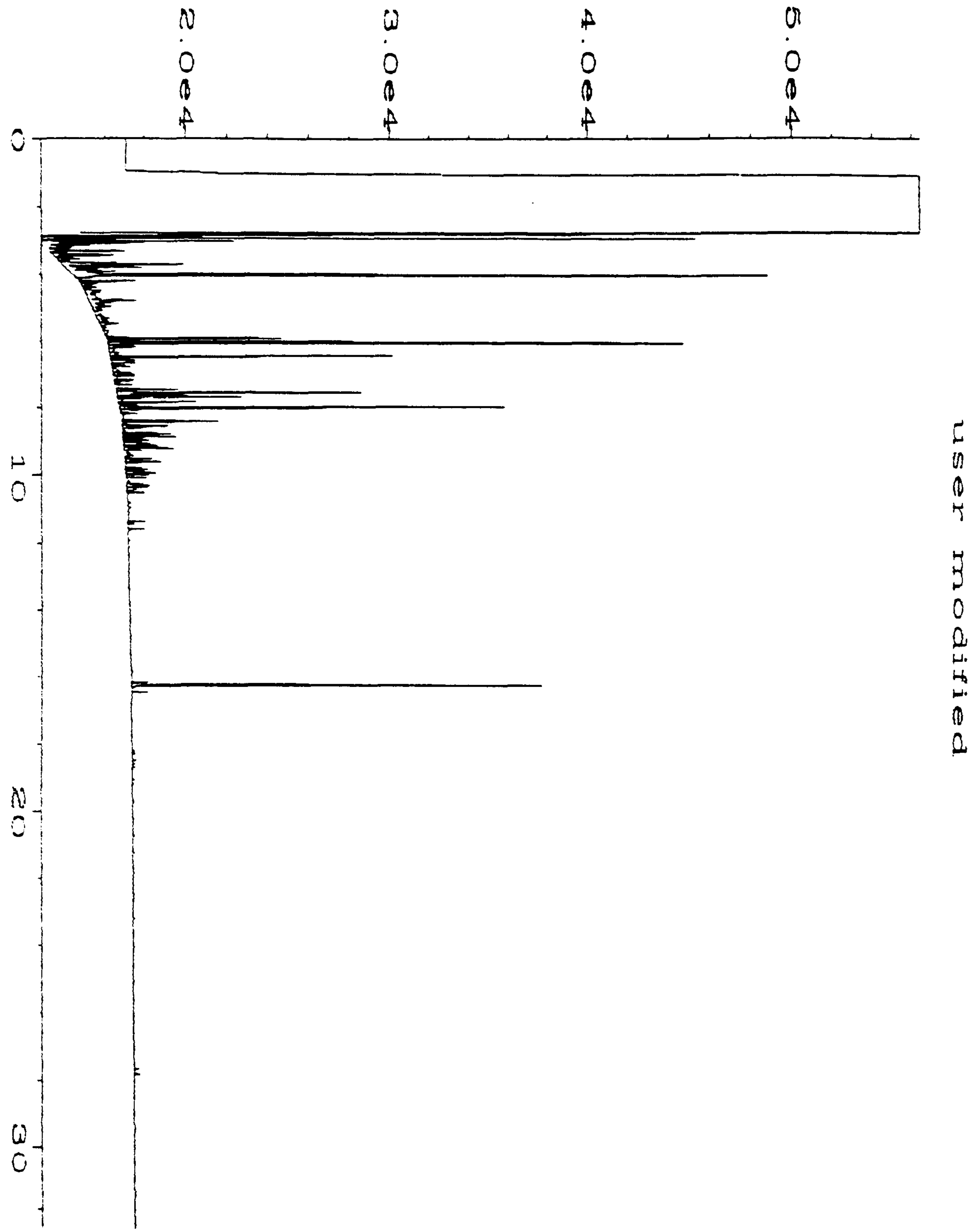

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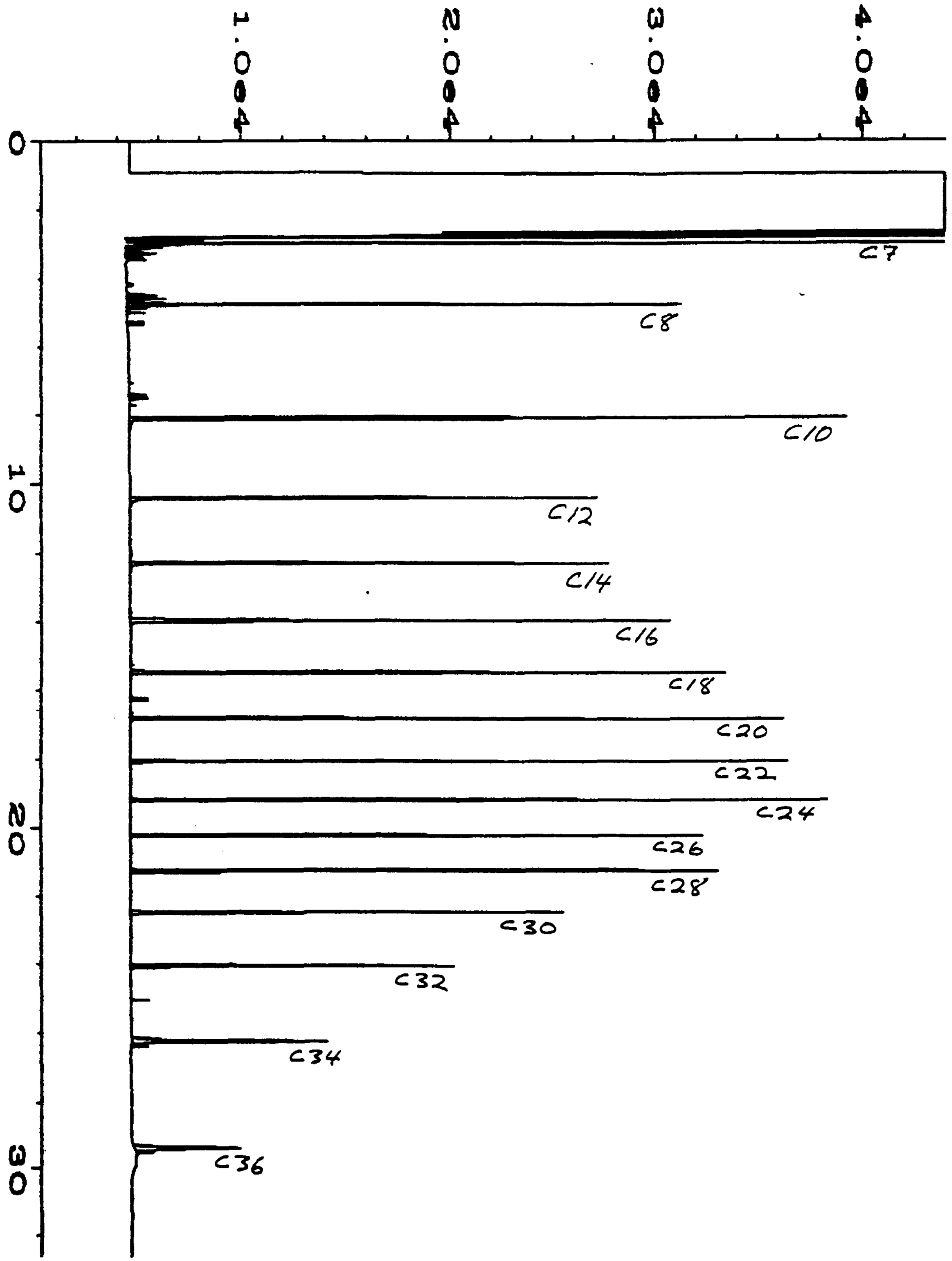
Data File Name    : C:\HPCHEM\1\DATA\30SEP96\004F0201.D
Operator          : MC & JE                          Page Number      : 1
Instrument        : GC#1 5890                        Vial Number      : 4
Sample Name       : GCG-95-10 GAS                    Injection Number : 1
Run Time Bar Code:                                   Sequence Line    : 2
Acquired on       : 30 Sep 96  04:06 PM              Instrument Method: SGF0613.MTH
Report Created on: 01 Oct 96  09:11 AM               Analysis Method  : SGF0613.MTH
```



Data File Name	: C:\HPCHEM\1\DATA\11APR96\004F0101.D				
Operator	: DJ		**Page Number**	:	1
Instrument	: GC#1 5890		**Vial Number**	:	4
Sample Name	: RET TIME STAND		**Injection Number**	:	1
Run Time Bar Code	:		**Sequence Line**	:	1
Acquired on	: 11 Apr 96	10:17 AM	**Instrument Method**	:	SDF0311.MTH
Report Created on	: 11 Apr 96	01:53 PM	**Analysis Method**	:	SDF0311.MTH

El Paso
Natural Gas Company

P.O. Box 1492
El Paso, TX 79978
Phone: 915-541-2600

February 13, 1996

RECEIVED
FEB 14 1996
OIL CONSERVATION DIVISION

Mr. William C. Olson
Environmental Bureau
New Mexico Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, New Mexico 87505

Subject: **Pond Closures**
EPNG San Juan River Plant

Dear Bill,

Four ponds at San Juan River Plant have been closed according to the plans submitted to you in October, 1995 and approved by you on November 1, 1995. All work was completed by January 19, 1996 and as-built cross sections were surveyed on January 24, 1996. Enclosed are copies of as-built drawings for the site.

The three former wastewater ponds were closed by moving dirt from the dikes into the low areas, grading everything to a single drainage in the approximate location of pit 3. The entire site was capped with low permeability clay soil, and machine compacted. The fourth pond was used only for raw water storage, and was closed by breaching the dike and leveling the area. Some material from this dike was used in closing the wastewater ponds. The entire disturbed area was re-seeded with a BLM approved native grass mix.

Denny Foutz of the OCD Aztec Office was on site periodically to inspect activities, and met with EPNG and RossRae representatives on January 11 to approve the work that had been completed.

Please call me at 915-541-2839 if you have any questions.

Sincerely,

Nancy K. Prince

Nancy K. Prince, CGWP
Principal Environmental Scientist
Environmental Affairs Department

Encl. San Juan Plant Pond Closure As Built Topography, January 23, 1996
cc: D. Foutz (w/encl.) T. D. Hutchins (e) J. McNeely (e)

RECEIVED
FEB 14 1996
Environmental Bureau
Oil Conservation Division

```
Project: rossrea                                          Mon Jan 29 08:26:30
1996
Site: rossrea   Surface 1: exist  Surface 2: azblt  Volume tag: azblt
                      EARTHWORKS END AREA VOLUME LISTING
               Cut          Fill       Cut 1.2300    Fill 1.3000   Cut 1.2300    Fill 1.3000
  Station    Area (sqft)  Area (sqft)  Volume (yds)  Volume (yds)  Tot Vol (yds)  Tot
Vol (yds)  Mass Ordinate
--------------------------------------------------------------------------------------------
--------------
      0+00      81.73       289.20
                                  83.52      366.06        83.52       366.06     -
282.54
      0+25      64.93       319.02
                                  84.30      417.65       167.82       783.71     -
615.89
      0+50      83.12       374.92
                                 122.68      531.27       290.50      1314.97     -
1024.48
      0+75     132.31       507.80
                                 182.05      746.08       472.55      2061.06     -
1588.51
      1+00     187.39       731.85
                                 247.51      879.86       720.06      2940.91     -
2220.86
      1+25     247.25       730.07
                                 324.16      823.12      1044.21      3764.03     -
2719.82
      1+50     321.99       637.58
                                 424.13      663.94      1468.35      4427.97     -
2959.63
      1+75     422.83       465.59
                                 581.98      438.82      2050.33      4866.80     -
2816.47
      2+00     599.19       263.54
                                 870.86      431.91      2921.18      5298.71     -
2377.52
      2+25     930.12       454.09
                                1261.04      704.46      4182.22      6003.17     -
1820.94
      2+50    1284.38       716.40
                                1612.37     1054.42      5794.59      7057.59     -
1263.00
      2+75    1547.10      1035.56
                                1835.15     1458.27      7629.75      8515.86     -
886.12
      3+00    1675.61      1387.41
                                1833.95     2491.11      9463.69     11006.97     -
1543.27
      3+25    1544.98      2751.66
                                1730.43     4873.64     11194.12     15880.60     -
4686.49
      3+50    1493.82      5346.08
                                1682.99     6581.26     12877.11     22461.86     -
9584.75
      3+75    1461.68      5588.94
                                1930.38     6675.91     14807.50     29137.77     -
14330.28
```

```
        4+00     1928.26     5503.34
                                 2208.76     6988.57     17016.26     36126.34   -
19110.08
        4+25     1950.54     6108.43
                                 2313.62     7495.40     19329.88     43621.74   -
24291.86
        4+50     2112.40     6345.47
                                 2528.67     7453.40     21858.55     51075.14   -
29216.59
        4+75     2328.20     6038.65
                                 2738.87     6809.16     24597.42     57884.31   -
33286.88
        5+00     2481.53     5275.04
                                 2909.56     5703.98     27506.99     63588.28   -
36081.30
        5+25     2627.95     4202.34
                                 3082.04     4708.92     30589.03     68297.20   -
37708.17
        5+50     2784.42     3621.72
                                 3098.57     4194.39     33687.60     72491.59   -
38803.99
        5+75     2656.98     3347.43
                                 2986.91     4138.57     36674.51     76630.16   -
39955.65
        6+00     2588.32     3528.96
                                 3398.97     4487.20     40073.48     81117.36   -
41043.88
        6+25     3380.60     3926.70
                                 4398.95     4749.47     44472.43     85866.83   -
41394.40
        6+50     4344.38     3964.72
                                 5490.13     4599.59     49962.56     90466.42   -
40503.86
        6+75     5296.82     3677.67
```

```
Project: rossrea                                          Mon Jan 29 08:26:34
1996
                         6510.94     4180.27     56473.50     94646.69    -
38173.19
     7+00      6137.02   3268.01
                         7055.83     3533.18     63529.33     98179.86    -
34650.53
     7+25      6253.71   2602.50
                         7313.90     2750.89     70843.23    100930.75    -
30087.52
     7+50      6590.21   1968.20
                         7146.62     2595.61     77989.85    103526.36    -
25536.51
     7+75      5959.94   2344.50
                         6904.72     3284.74     84894.57    106811.10    -
21916.53
     8+00      6165.42   3113.22
                         6293.38     3581.50     91187.95    110392.60    -
19204.65
     8+25      4886.37   2837.58
                         5125.22     3324.90     96313.17    113717.50    -
17404.34
     8+50      4114.02   2686.87
                         4579.84     3106.05    100893.01    116823.55    -
15930.55
     8+75      3928.63   2473.96
                         4704.74     2611.07    105597.75    119434.62    -
13836.87
     9+00      4333.35   1864.43
                         5788.50     2032.77    111386.25    121467.39    -
10081.14
     9+25      5831.82   1513.10
                         5187.06     1466.46    116573.31    122933.85    -
6360.54
     9+50      3277.16    923.48
                         3772.78      959.54    120346.09    123893.39    -
3547.30
     9+75      3348.21    670.84
                         4083.71      879.85    124429.80    124773.24    -
343.44
     10+00     3823.18    791.06
                         4120.87      923.24    128550.67    125696.49
2854.19
     10+25     3413.47    742.94
                         3381.34      801.15    131932.01    126497.64
5434.38
     10+50     2524.49    588.20
                         2287.63      528.34    134219.65    127025.98
7193.67
     10+75     1492.82    289.66
                         1315.01      338.69    135534.66    127364.67
8169.98
     11+00      816.47    273.09
                          722.76      680.89    136257.42    128045.57
8211.85
     11+25      452.77    858.24
```

```
                          503.80     1341.15    136761.22    129386.71
7374.51
      11+50     431.96    1370.13
                          386.07     1328.50    137147.29    130715.21
6432.08
      11+75     246.01    837.22
                          775.74     533.22     137923.03    131248.43
6674.60
      12+00     1116.27   48.75
                          693.89     30.13      138616.92    131278.56
7338.36
      12+25     102.28    1.31
                          58.24      0.79       138675.16    131279.35
7395.81
      12+50     0.00      0.00
                          0.00       0.00       138675.16    131279.35
7395.81
      12+75     0.00      0.00
                          0.00       0.00       138675.16    131279.35
7395.81
      13+00     0.00      0.00
```

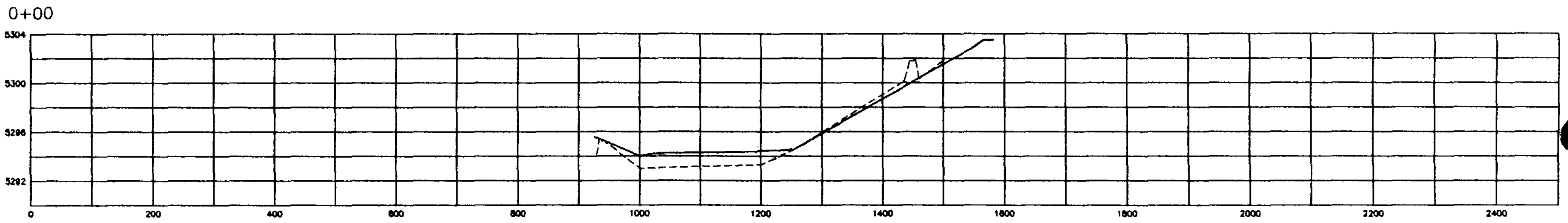
```
Project: rossrea                                              Wed Jan 24 15:40:26
1996
Site: rossrea   Surface 1: grid  Surface 2: azblt  Volume tag: over
                          EARTHWORKS END AREA VOLUME LISTING
              Cut        Fill      Cut 1.2300   Fill 1.3000   Cut 1.2300   Fill 1.3000
  Station    Area (sqft)  Area (sqft)  Volume (yds)  Volume (yds)  Tot Vol (yds)  Tot
Vol (yds)  Mass Ordinate
--------------------------------------------------------------------------------------------
--------------
     0+00       0.00       0.00
                              0.00       0.00       0.00       0.00       0.00
     0+25       0.00       0.00
                              0.00       0.00       0.00       0.00       0.00
     0+50       0.00       0.00
                              0.00       0.00       0.00       0.00       0.00
     0+75       0.00       0.00
                              0.00       0.00       0.00       0.00       0.00
     1+00       0.00       0.00
                              0.00       0.00       0.00       0.00       0.00
     1+25       0.00       0.00
                              0.00       0.00       0.00       0.00       0.00
     1+50       0.00       0.00
                              0.00       0.00       0.00       0.00       0.00
     1+75       0.00       0.00
                              8.54     140.53       8.54     140.53    -131.99
     2+00      15.00     233.50
                             98.38     301.74     106.92     442.28     -
335.35
     2+25     157.76     267.86
                            247.21     353.04     354.13     795.32     -
441.19
     2+50     276.36     318.74
                            351.17     428.16     705.30    1223.48     -
518.18
     2+75     340.33     392.67
                            396.90     535.25    1102.20    1758.73     -
656.53
     3+00     356.67     496.67
                            424.28     616.81    1526.49    2375.54     -
849.05
     3+25     388.42     528.18
                            475.81     640.61    2002.30    3016.15     -
1013.85
     3+50     447.16     536.22
                            547.92     625.42    2550.22    3641.57     -
1091.35
     3+75     515.04     502.93
                            631.22     561.30    3181.44    4202.87     -
1021.43
     4+00     593.44     429.69
                            692.55     473.21    3873.99    4676.08     -
802.09
     4+25     622.74     356.57
                            718.79     387.54    4592.78    5063.62     -
470.84
     4+50     639.53     287.34
```

				731.35	307.14	5324.13	5370.77
46.64							
	4+75	644.79	222.99				
				728.58	230.30	6052.71	5601.07
451.64							
	5+00	634.66	159.66				
				666.24	211.95	6718.94	5813.02
905.92							
	5+25	535.32	192.50				
				577.17	258.50	7296.11	6071.52
1224.59							
	5+50	478.25	237.00				
				526.83	309.12	7822.95	6380.64
1442.31							
	5+75	446.92	276.61				
				502.56	350.42	8325.51	6731.06
1594.45							
	6+00	435.63	305.63				
				447.52	327.22	8773.03	7058.28
1714.75							
	6+25	350.25	238.06				
				345.06	249.78	9118.09	7308.06
1810.03							
	6+50	255.71	176.96				
				258.80	208.26	9376.89	7516.32
1860.56							
	6+75	198.77	169.08				

```
Project: rossrea                                        Wed Jan 24 15:40:28
1996
                      233.75     250.25     9610.63     7766.57
1844.06
     7+00    211.71   246.71
                      260.79     282.15     9871.42     8048.73
1822.70
     7+25    246.26   222.10
                      313.55     258.41    10184.98     8307.13
1877.84
     7+50    304.37   207.26
                      382.46     242.27    10567.44     8549.40
2018.04
     7+75    367.27   195.28
                      463.75     243.78    11031.19     8793.18
2238.01
     8+00    447.12   209.77
                      520.25     209.31    11551.44     9002.49
2548.94
     8+25    466.48   138.02
                      578.65     138.13    12130.09     9140.62
2989.47
     8+50    549.69    91.49
                      711.86      99.50    12841.95     9240.12
3601.83
     8+75    700.41    73.83
                      914.66      87.91    13756.61     9328.03
4428.58
     9+00    905.82    72.23
                      904.65      82.50    14661.26     9410.53
5250.73
     9+25    682.83    64.84
                      641.29     214.74    15302.54     9625.27
5677.28
     9+50    443.34   291.96
                      473.55     502.30    15776.09    10127.57
5648.52
     9+75    388.26   542.64
                      434.32     781.40    16210.41    10908.97
5301.44
     10+00    374.45   755.68
                      351.06    1109.70    16561.48    12018.67
4542.80
     10+25    242.05  1088.13
                      271.52    1327.39    16833.00    13346.06
3486.94
     10+50    234.77  1117.38
                      259.47    1164.47    17092.46    14510.53
2581.93
     10+75    220.88   817.43
                      257.06     879.75    17349.52    15390.28
1959.24
     11+00    230.53   644.30
                      220.08     515.54    17569.60    15905.82
1663.78
     11+25    155.95   212.29
```

```
                          129.34     196.87    17698.95    16102.69
1596.26
     11+50      71.19    114.81
                           80.27     157.26    17779.22    16259.94
1519.28
     11+75      69.78    146.48
                           82.47     174.67    17861.69    16434.61
1427.08
     12+00      75.05    143.73
                           59.86      93.18    17921.55    16527.79
1393.76
     12+25      30.07     11.09
                           17.12       6.67    17938.67    16534.46
1404.21
     12+50       0.00      0.00
                            0.00       0.00    17938.67    16534.46
1404.21
     12+75       0.00      0.00
                            0.00       0.00    17938.67    16534.46
1404.21
     13+00       0.00      0.00
```

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 0+00



LEGEND

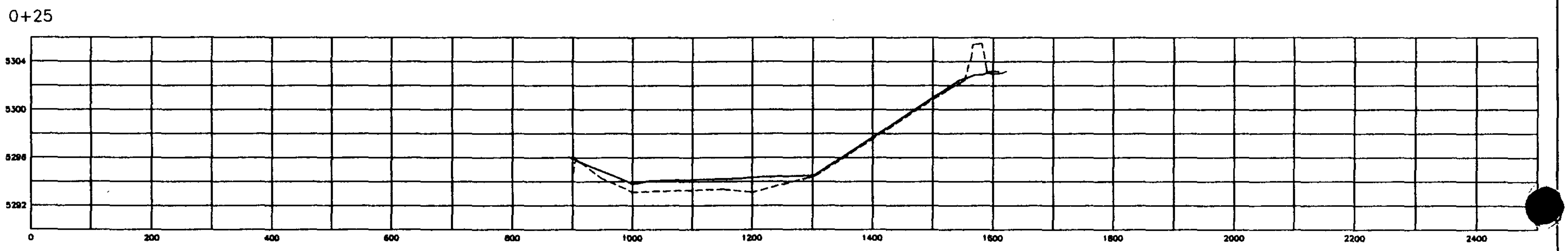
- - - - - - - - - - = ORIGINAL GROUND

———————— = ASBUILT GROUND

SCALE

HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 0+25



LEGEND

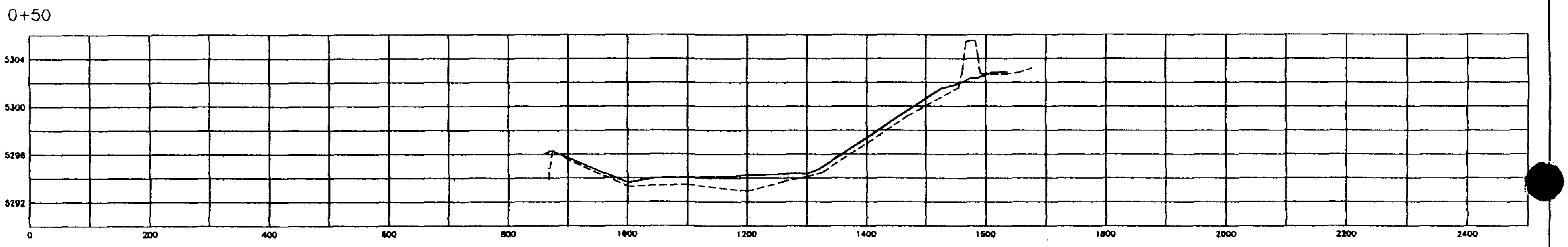
- - - - - - - - - - = ORIGINAL GROUND

――――――― = ASBUILT GROUND

SCALE

HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 0+50



LEGEND

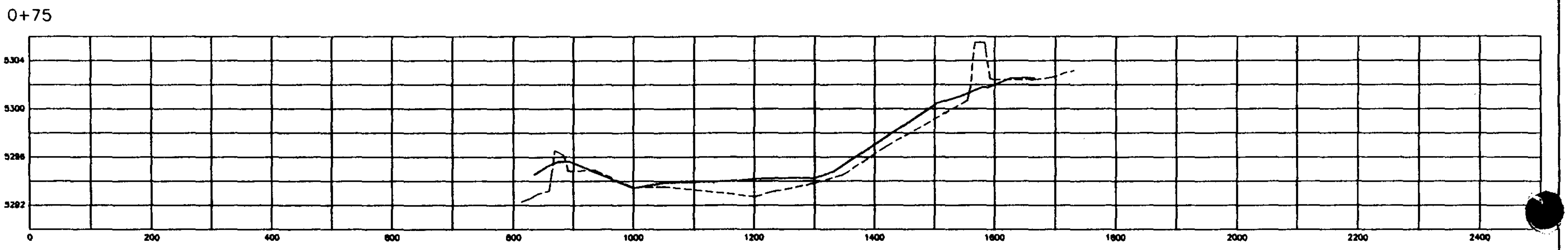
- - - - - - - - - - - = ORIGINAL GROUND

———————— = ASBUILT GROUND

SCALE

HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 0+75



LEGEND

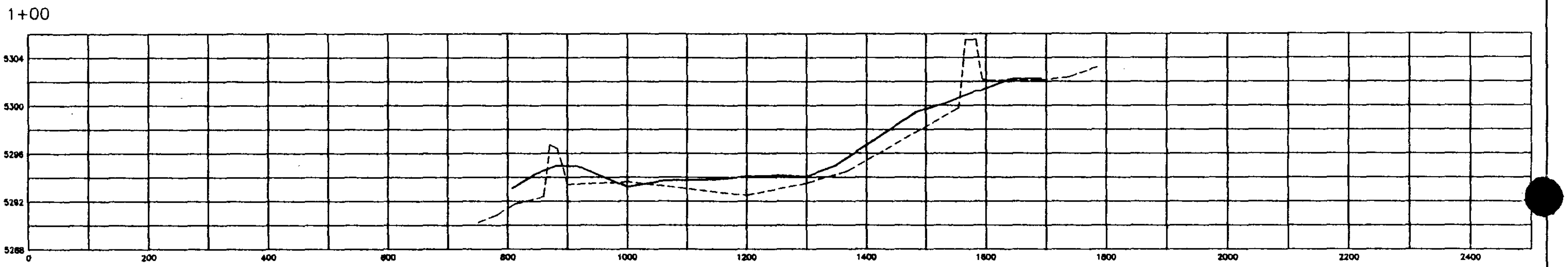
- - - - - - - - - = ORIGINAL GROUND

——————— = ASBUILT GROUND

SCALE

HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 1+00



LEGEND

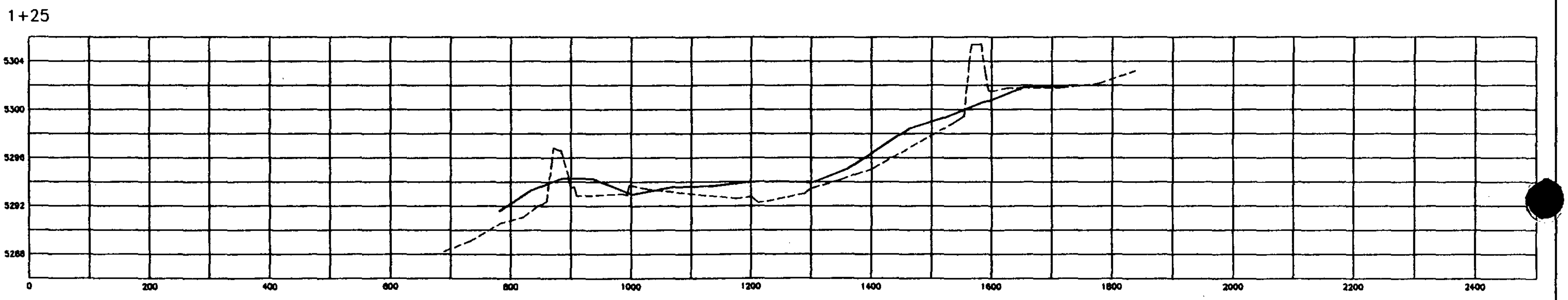
- - - - - - - - - - - = ORIGINAL GROUND

―――――――― = ASBUILT GROUND

SCALE

HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 1+25



LEGEND

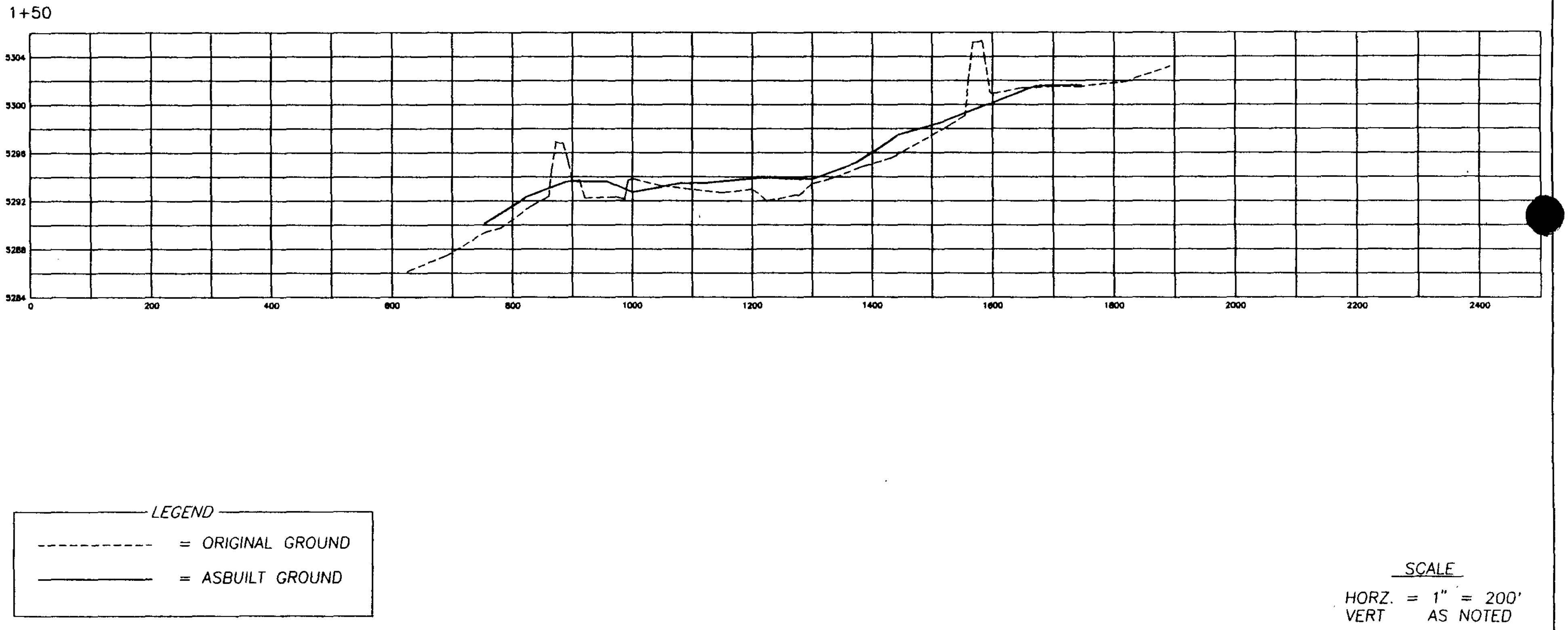
- - - - - - - - -	= ORIGINAL GROUND
————————	= ASBUILT GROUND

SCALE

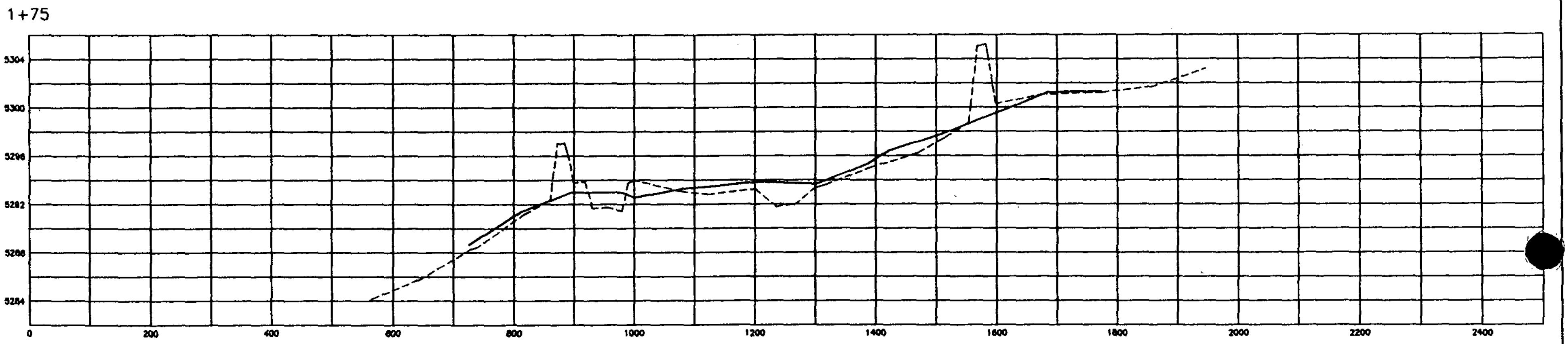
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure

Asbuilt X-Sections - Sta. 1+50



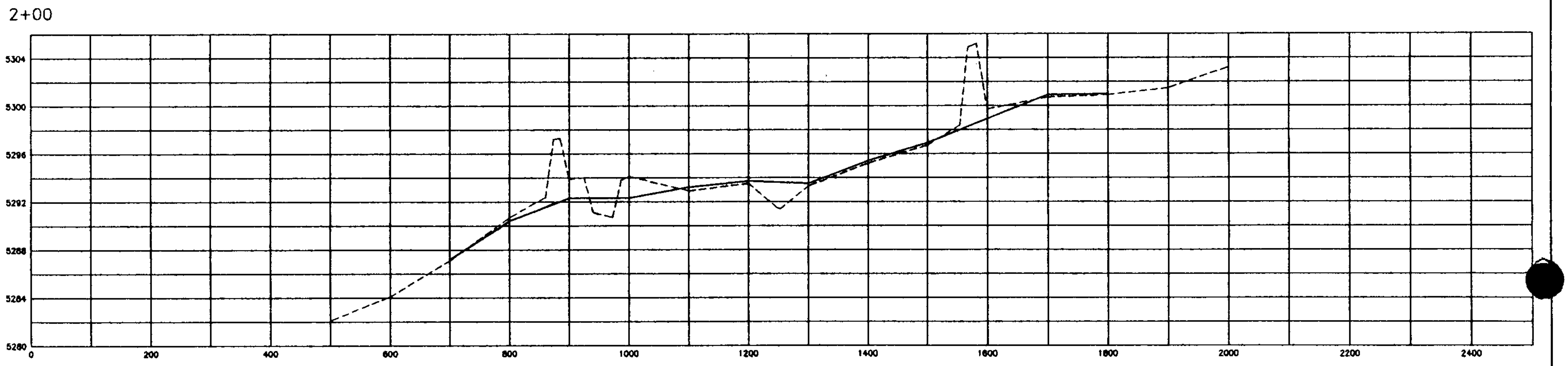
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 1+75



LEGEND
- - - - - - - - = ORIGINAL GROUND
———— = ASBUILT GROUND

SCALE
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 2+00



LEGEND

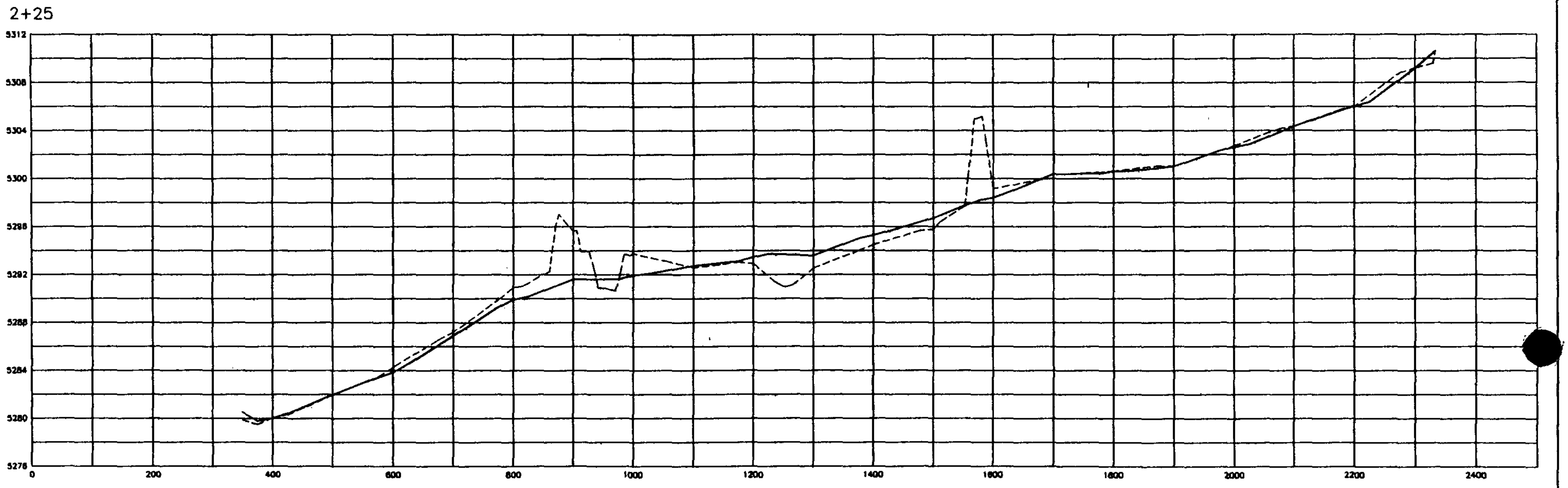
- - - - - - - - - - = ORIGINAL GROUND

———————— = ASBUILT GROUND

SCALE

HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 2+25



LEGEND

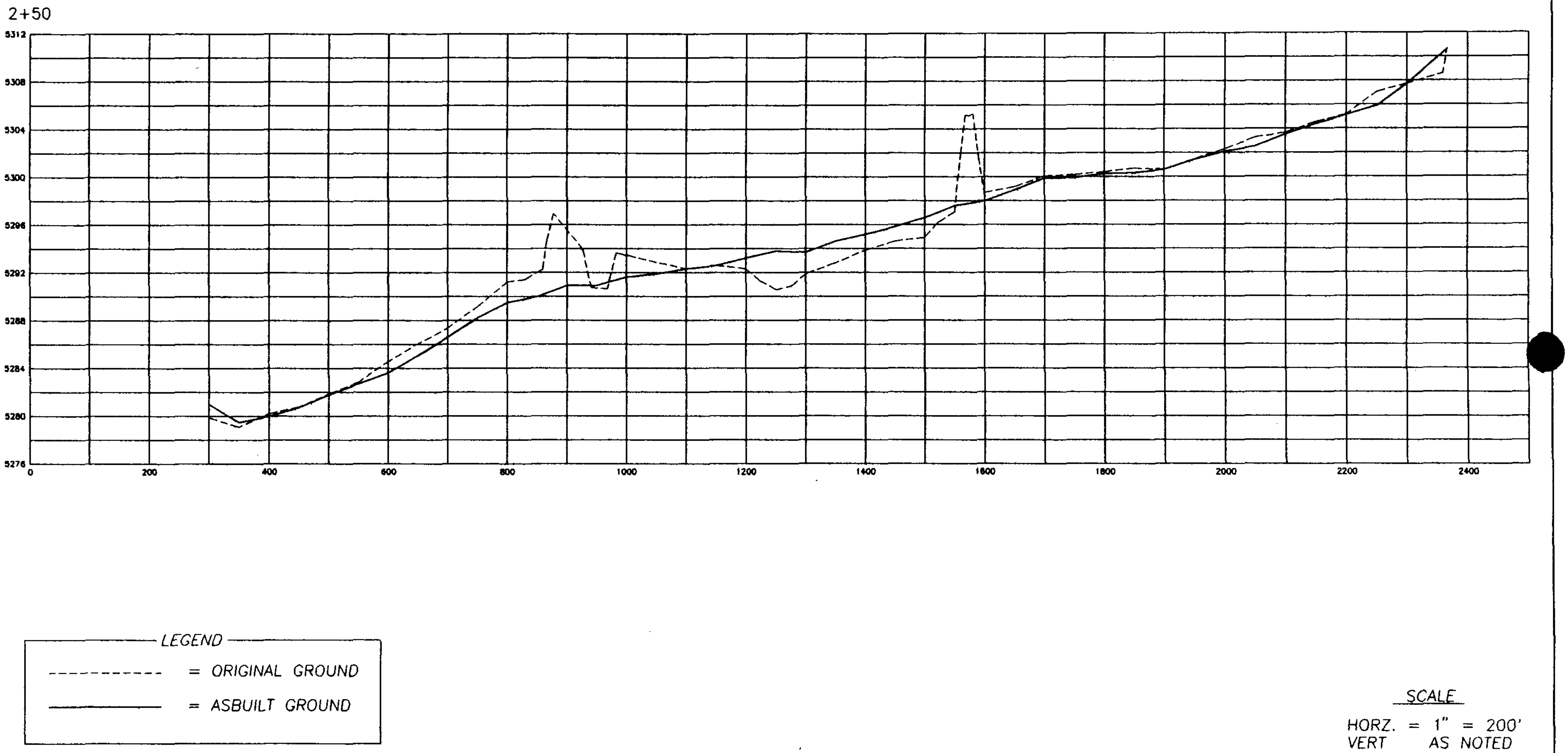
- - - - - - - - - - = ORIGINAL GROUND

———————— = ASBUILT GROUND

SCALE

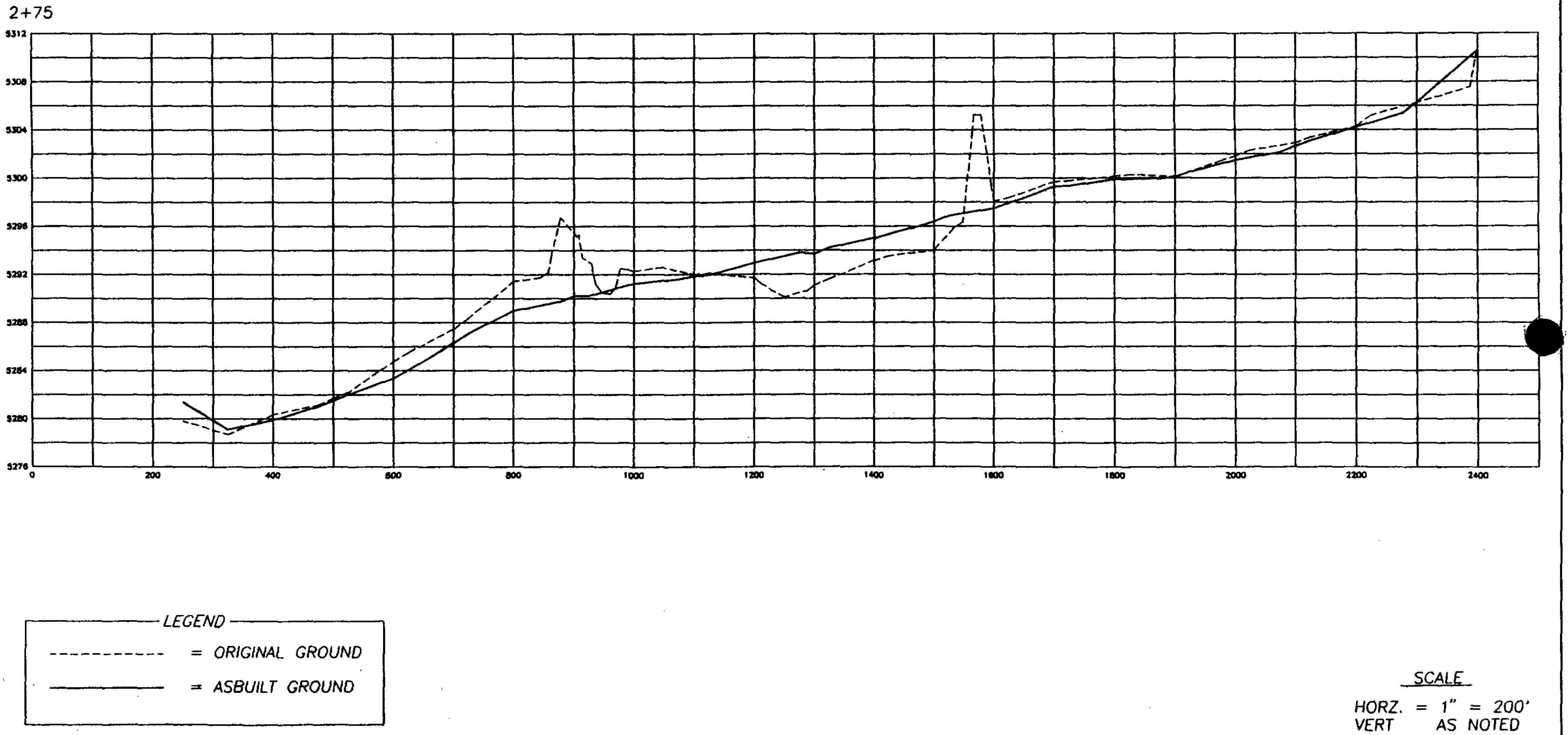
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 2+50



SCALE
HORZ. = 1" = 200'
VERT AS NOTED

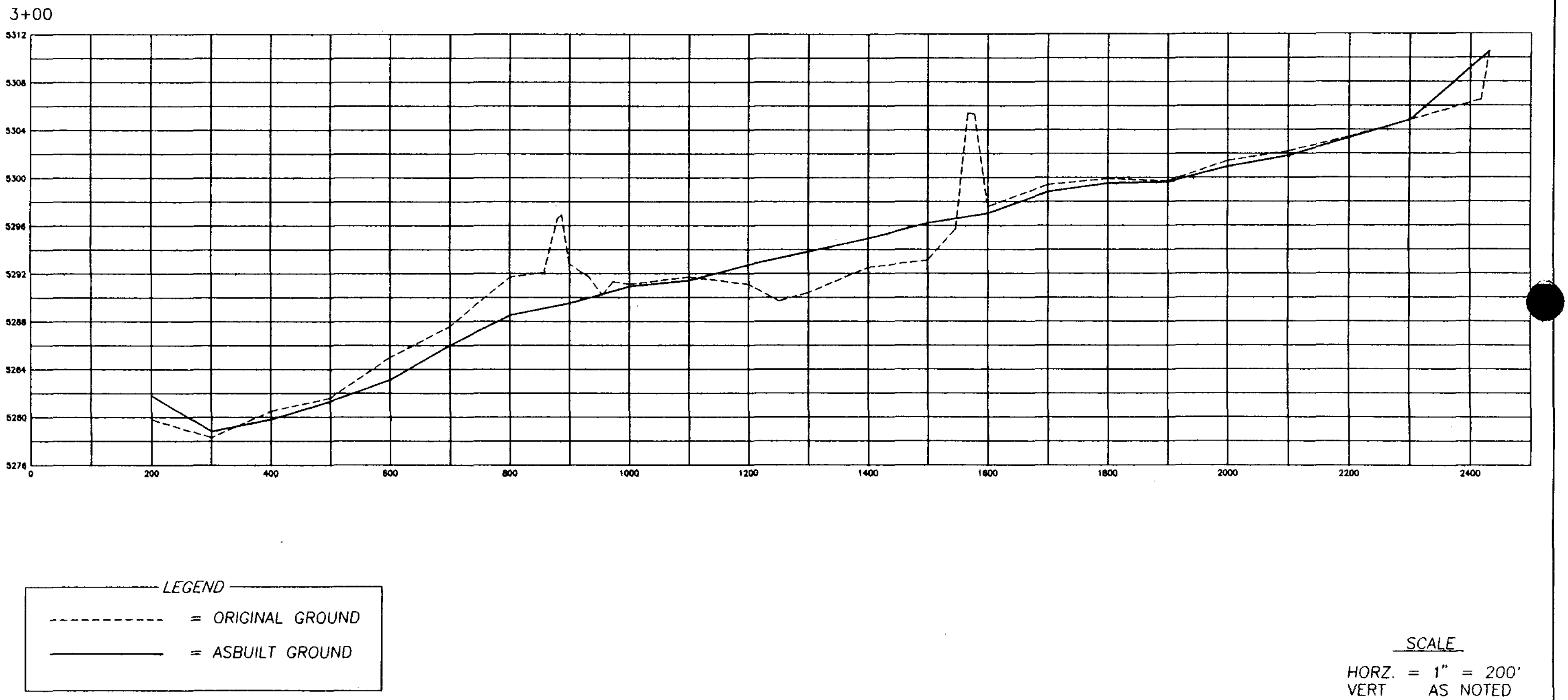
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 2+75



SCALE

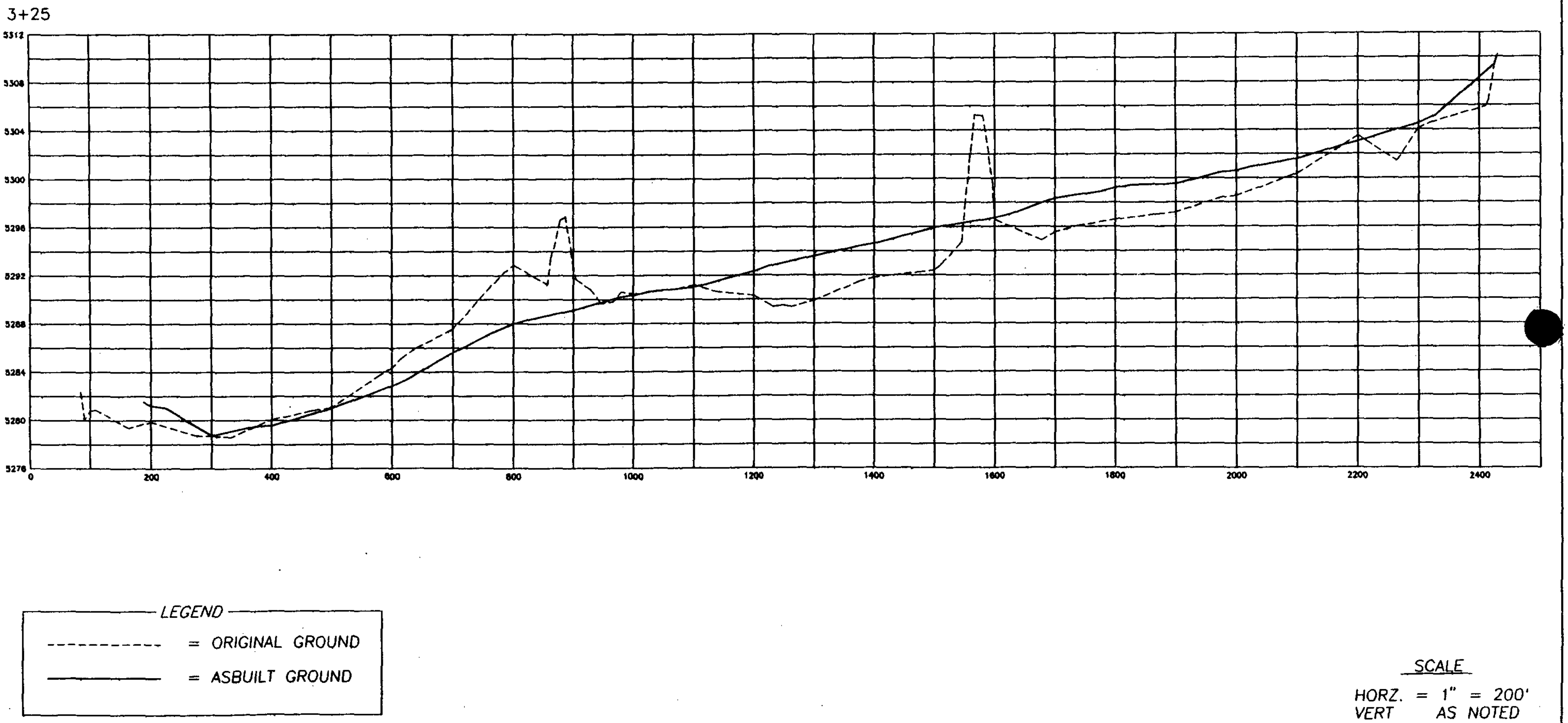
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 3+00



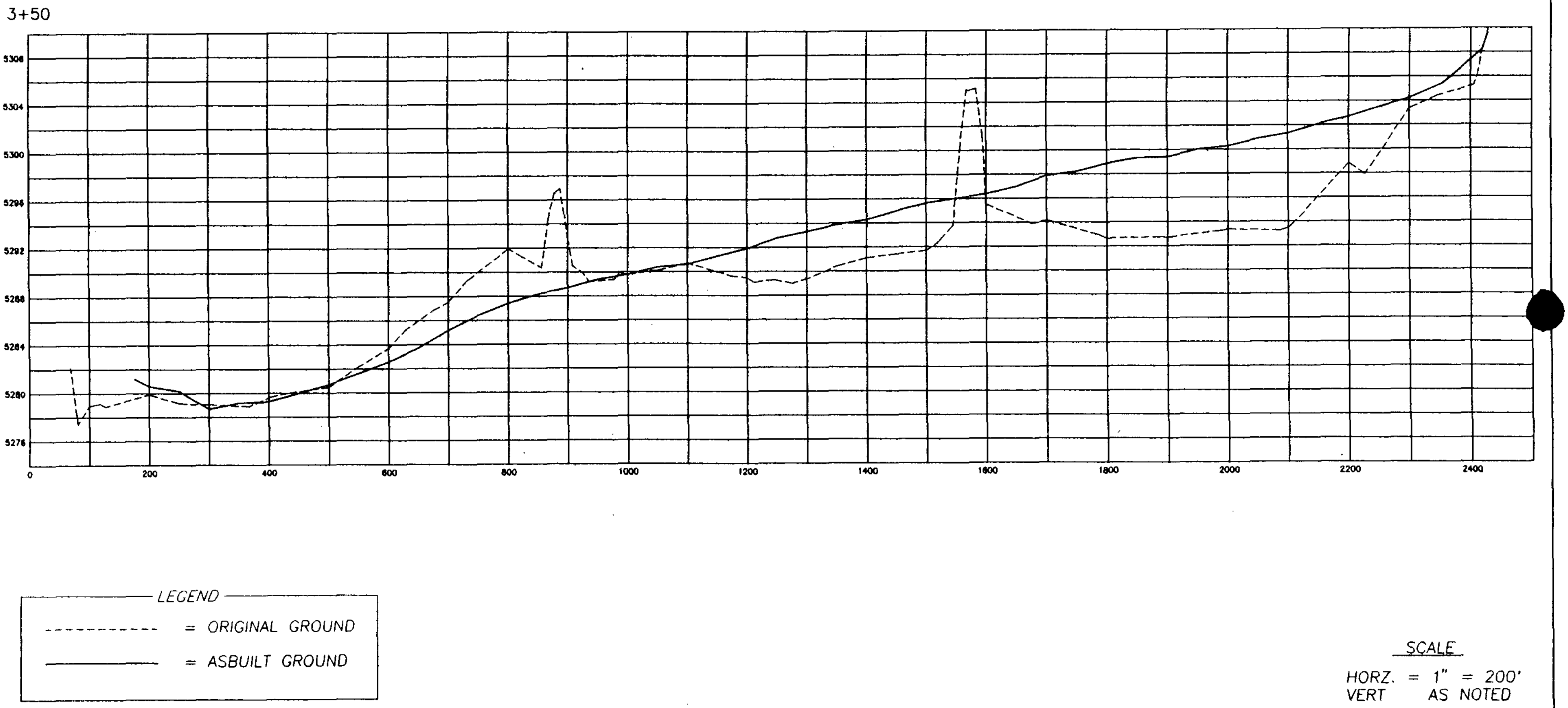
SCALE
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 3+25



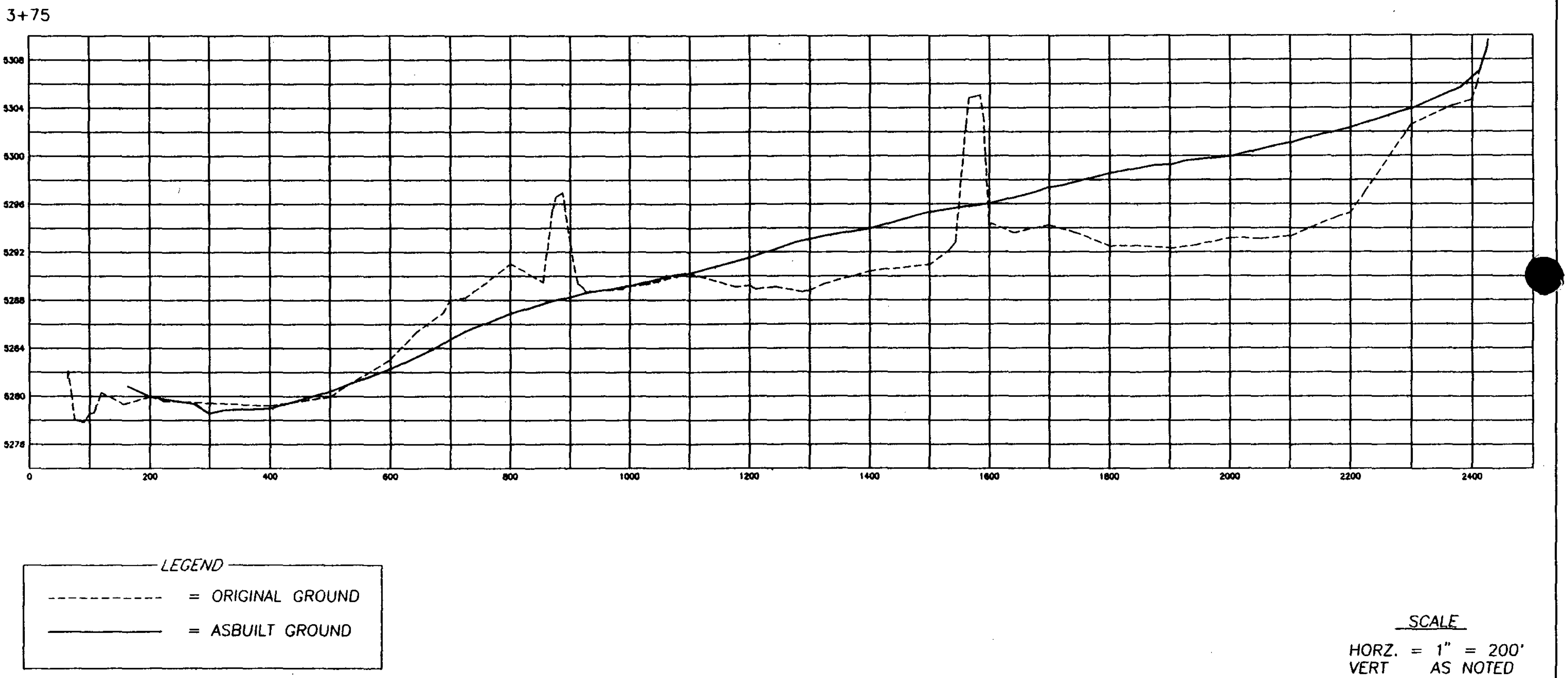
SCALE
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 3+50

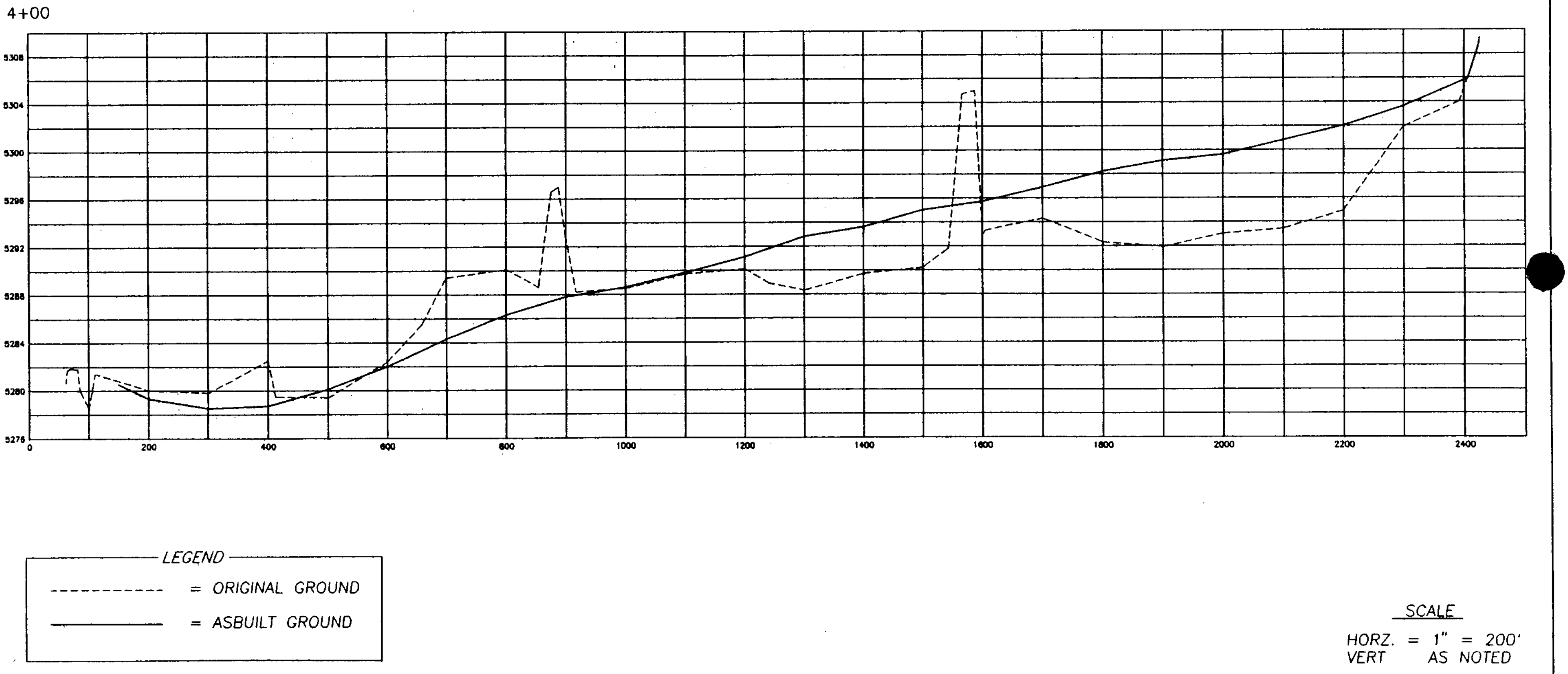


SCALE
HORZ. = 1" = 200'
VERT AS NOTED

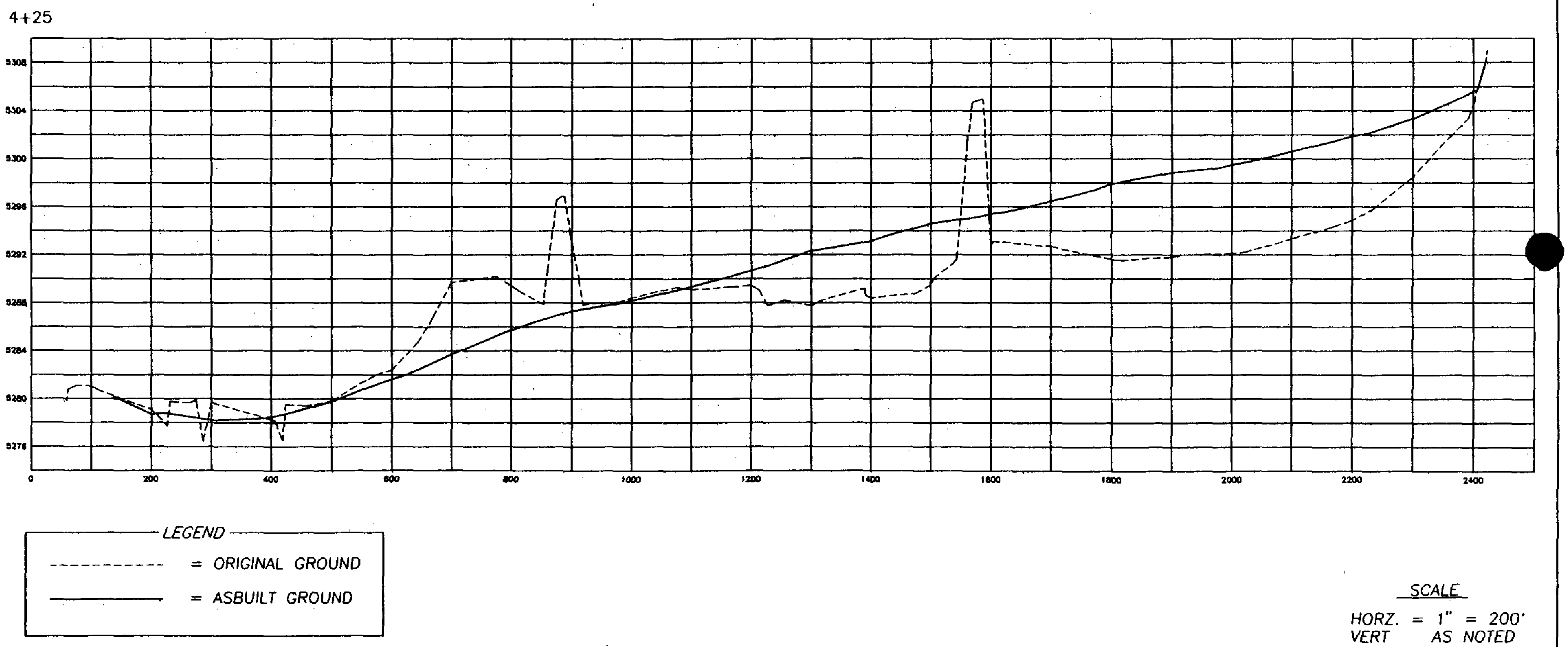
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 3+75



San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 4+00



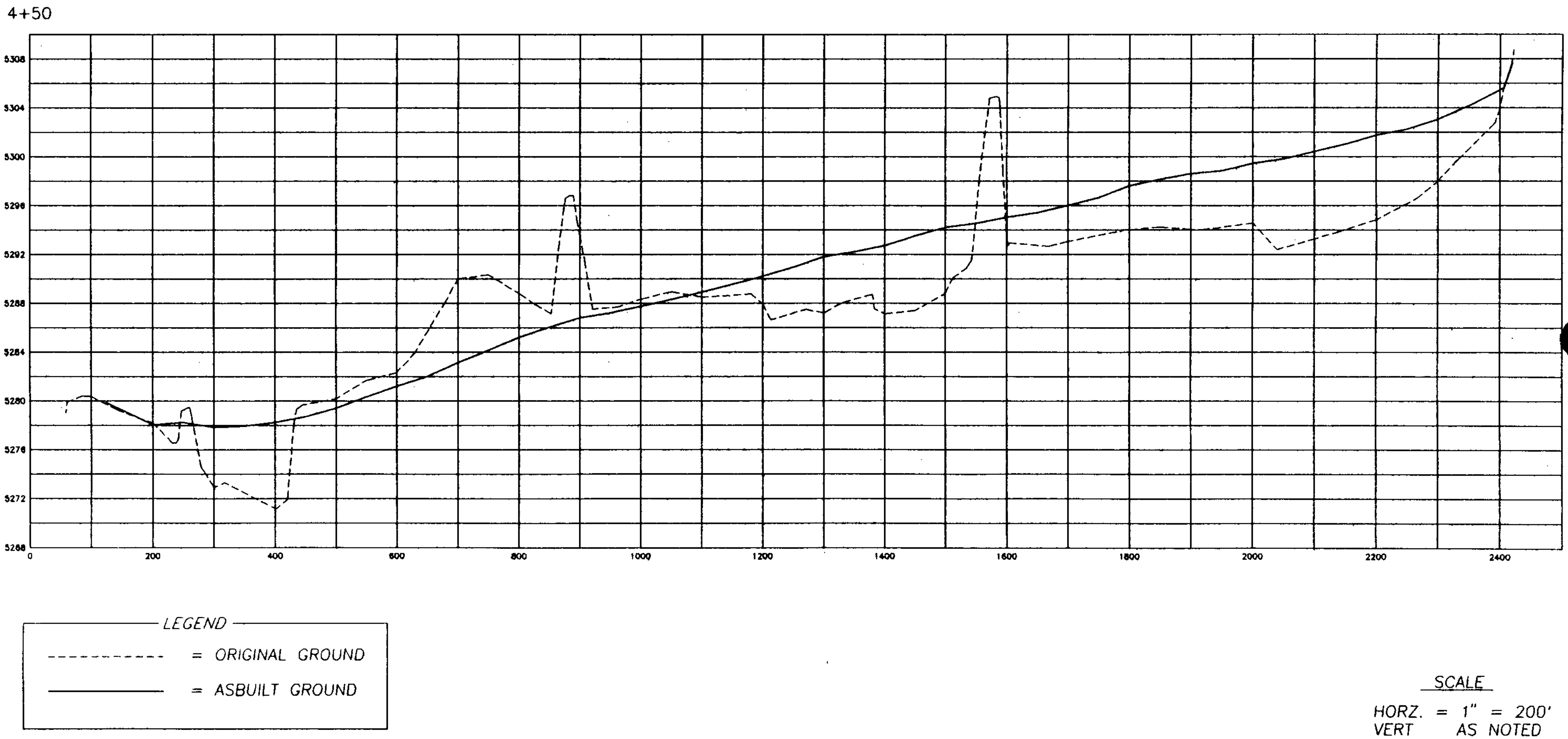
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 4+25



SCALE

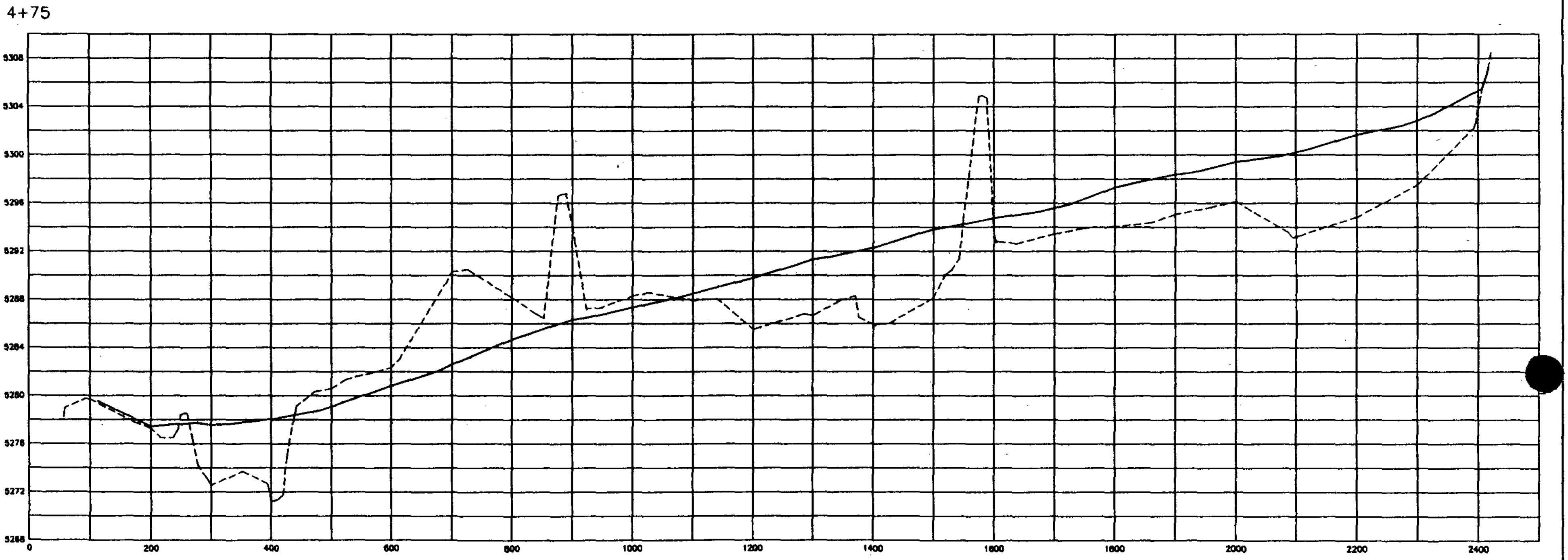
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 4+50



SCALE
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 4+75



LEGEND

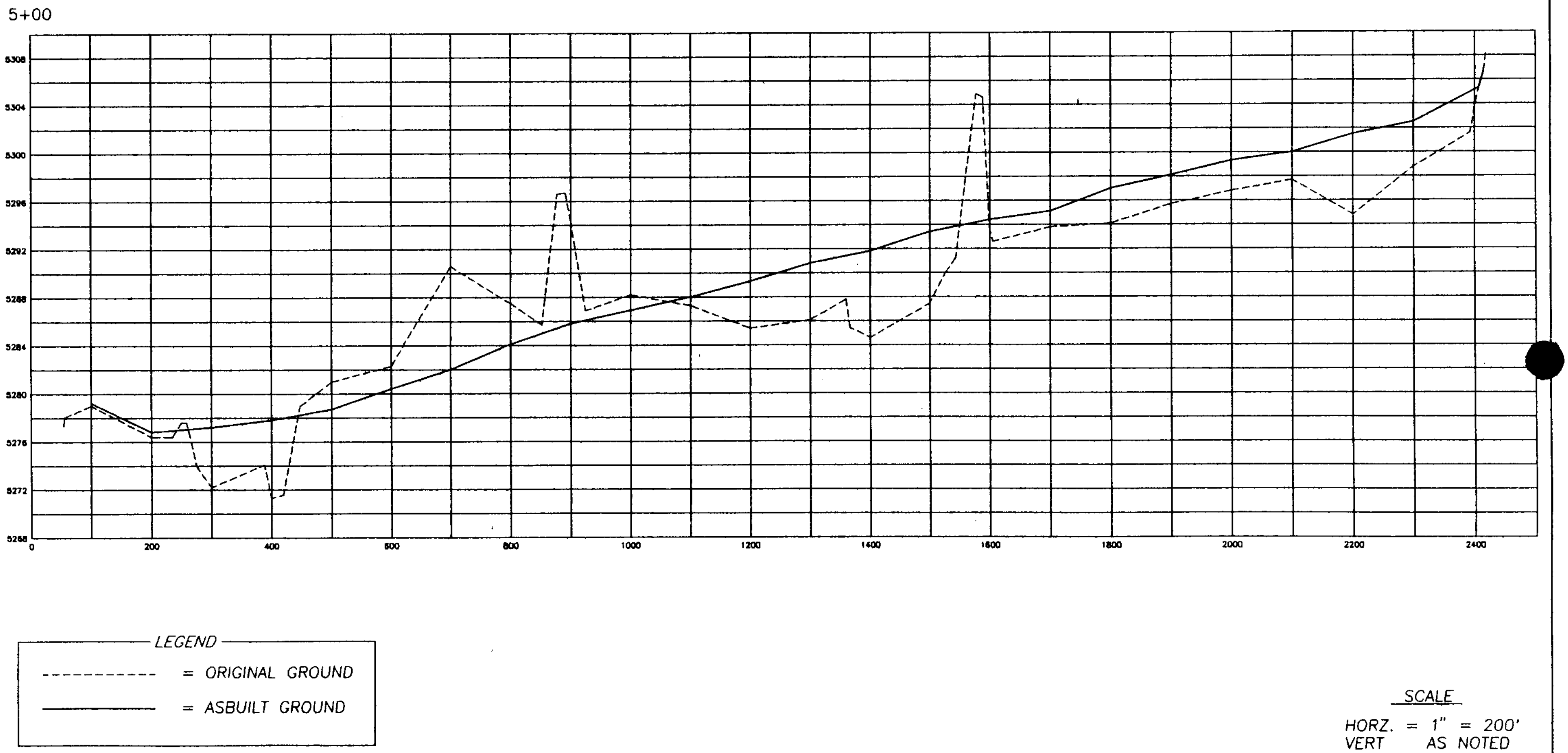
- - - - - - - - - = ORIGINAL GROUND

———————— = ASBUILT GROUND

SCALE

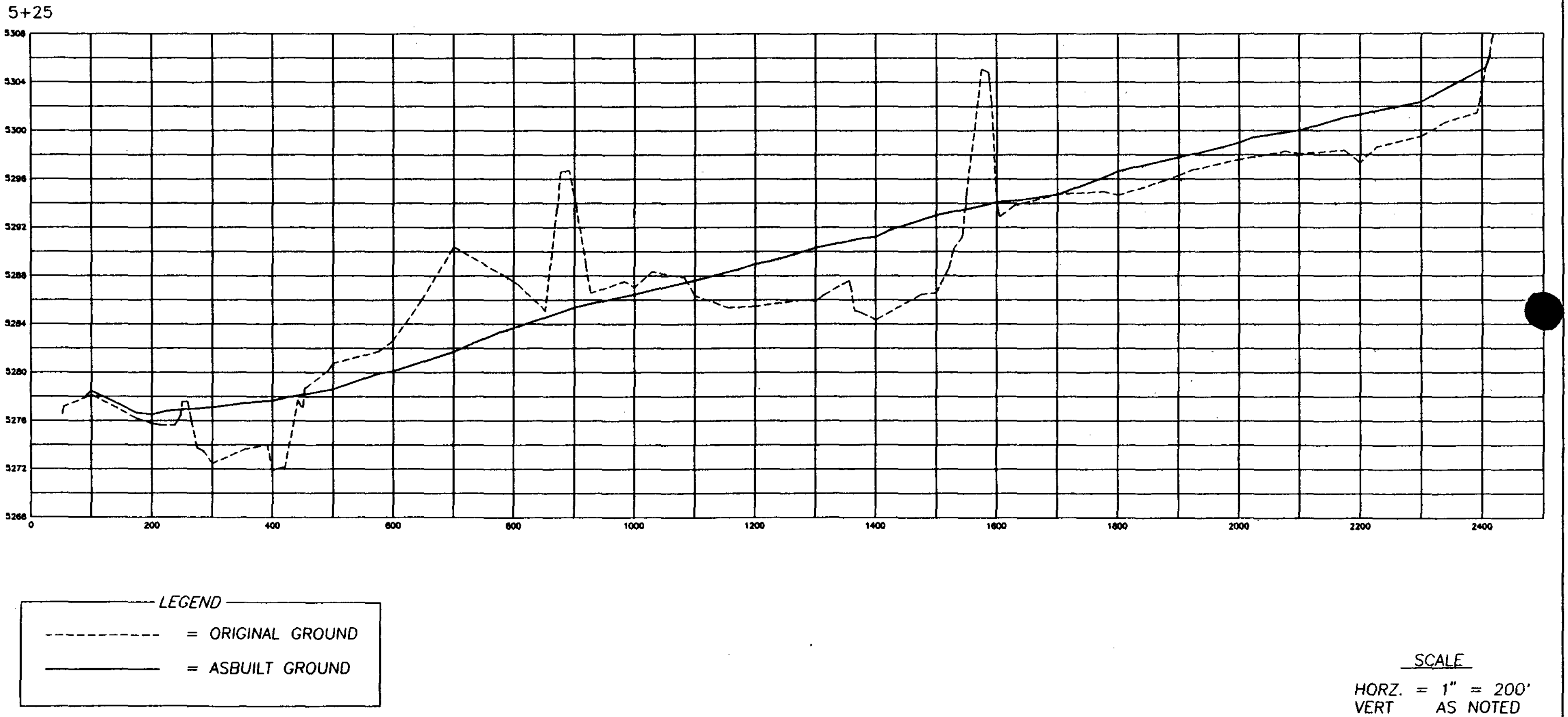
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 5+00



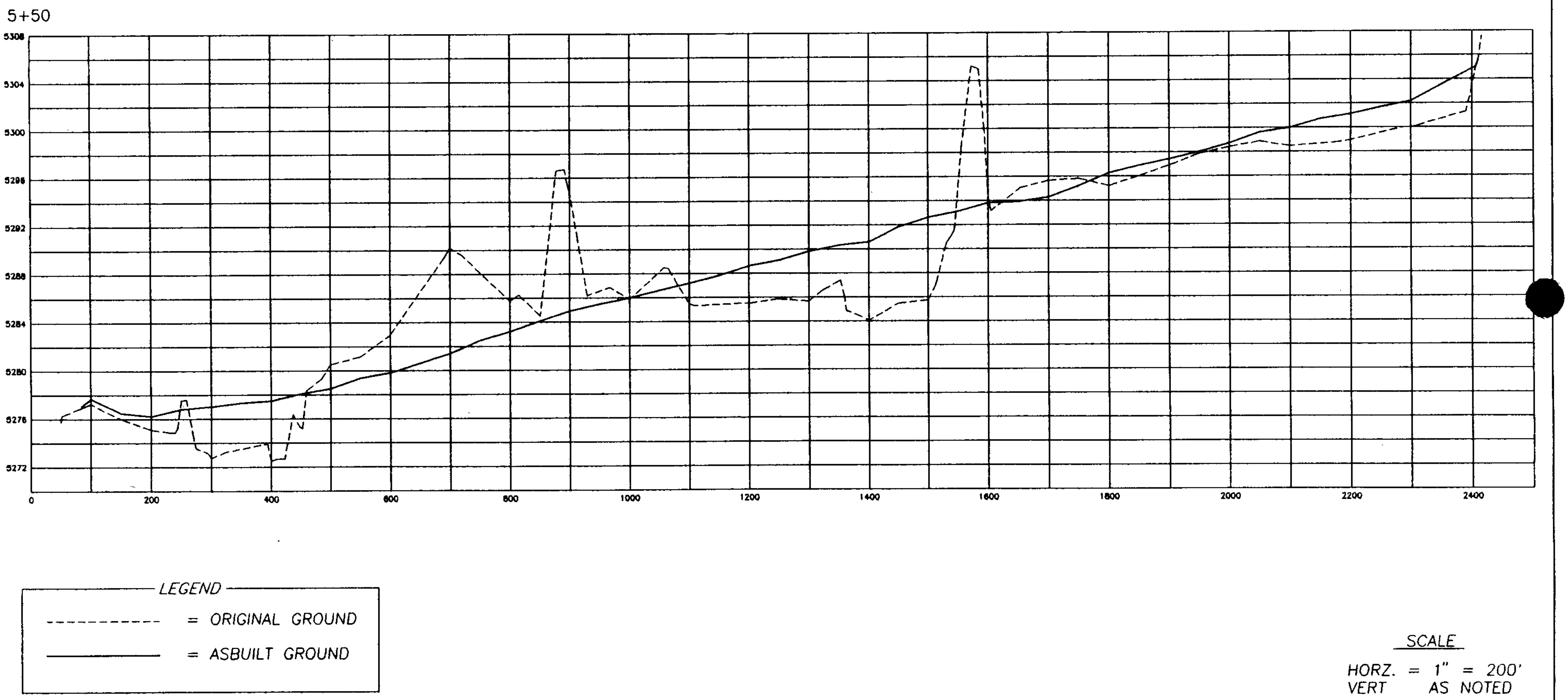
SCALE
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 5+25



SCALE
HORZ. = 1" = 200'
VERT AS NOTED

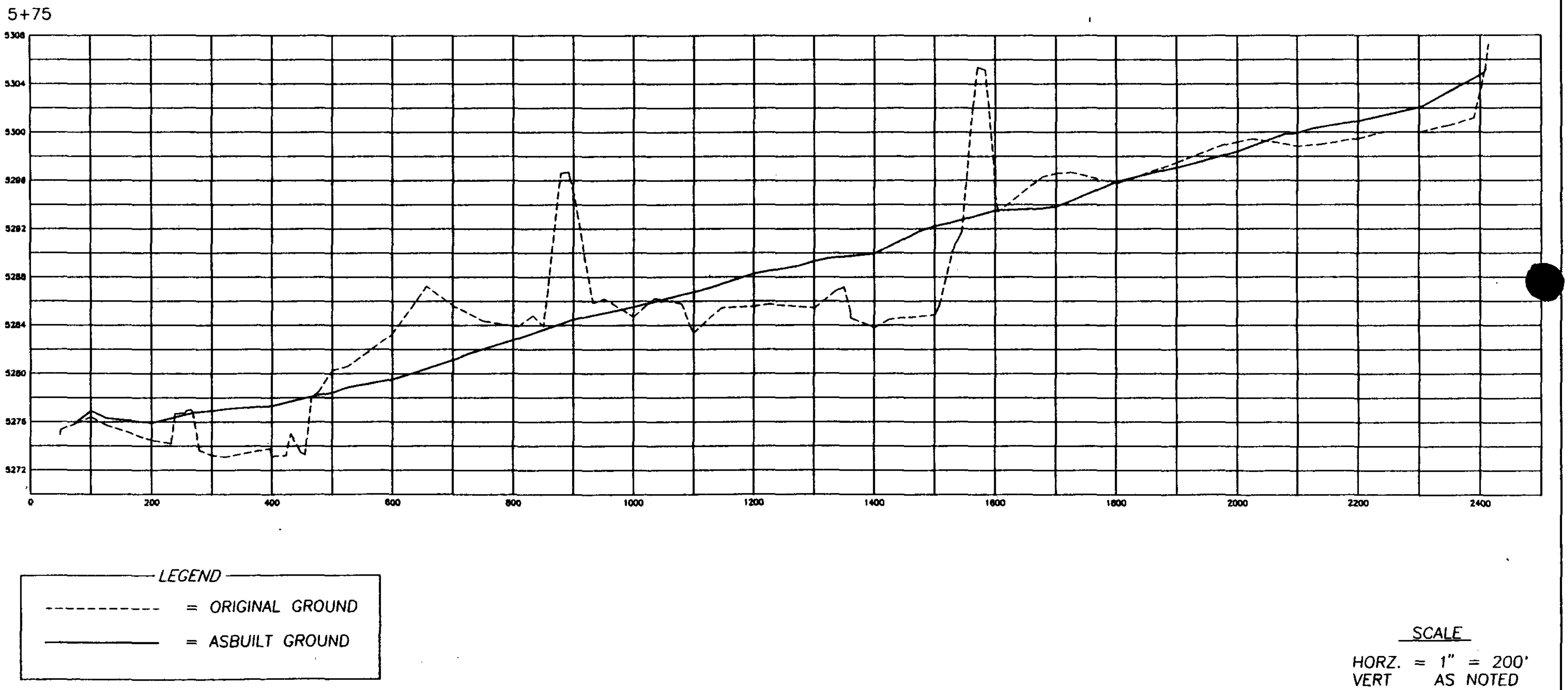
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 5+50



SCALE

HORZ. = 1" = 200'
VERT AS NOTED

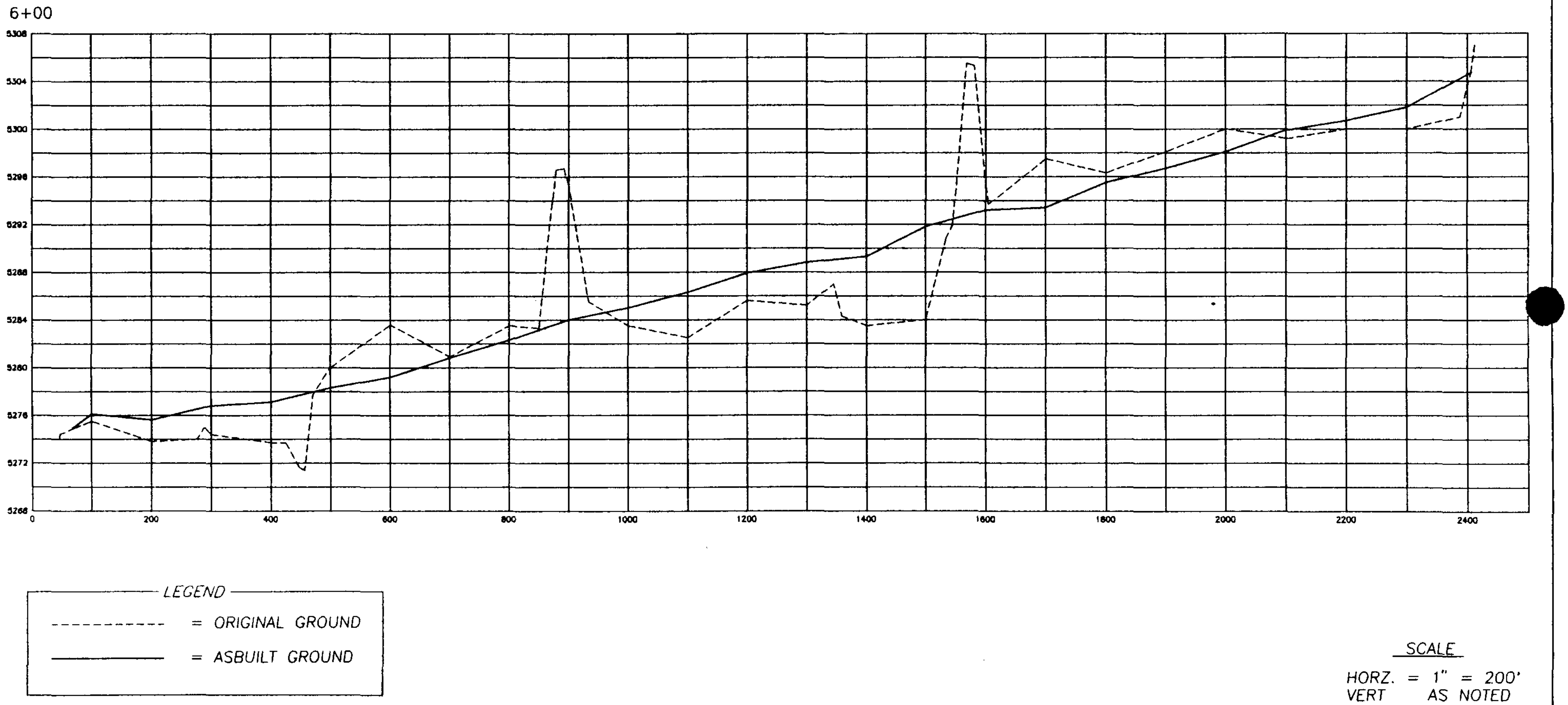
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 5+75



SCALE
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure

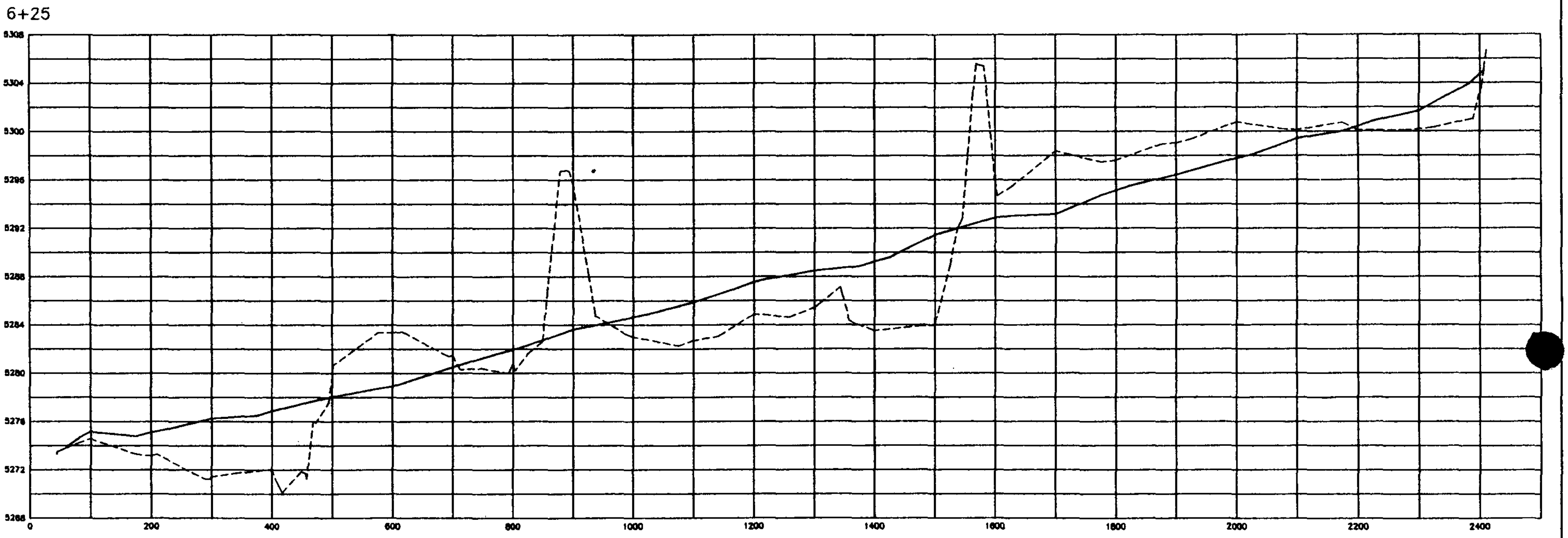
Asbuilt X-Sections - Sta. 6+00



SCALE

HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 6+25



LEGEND

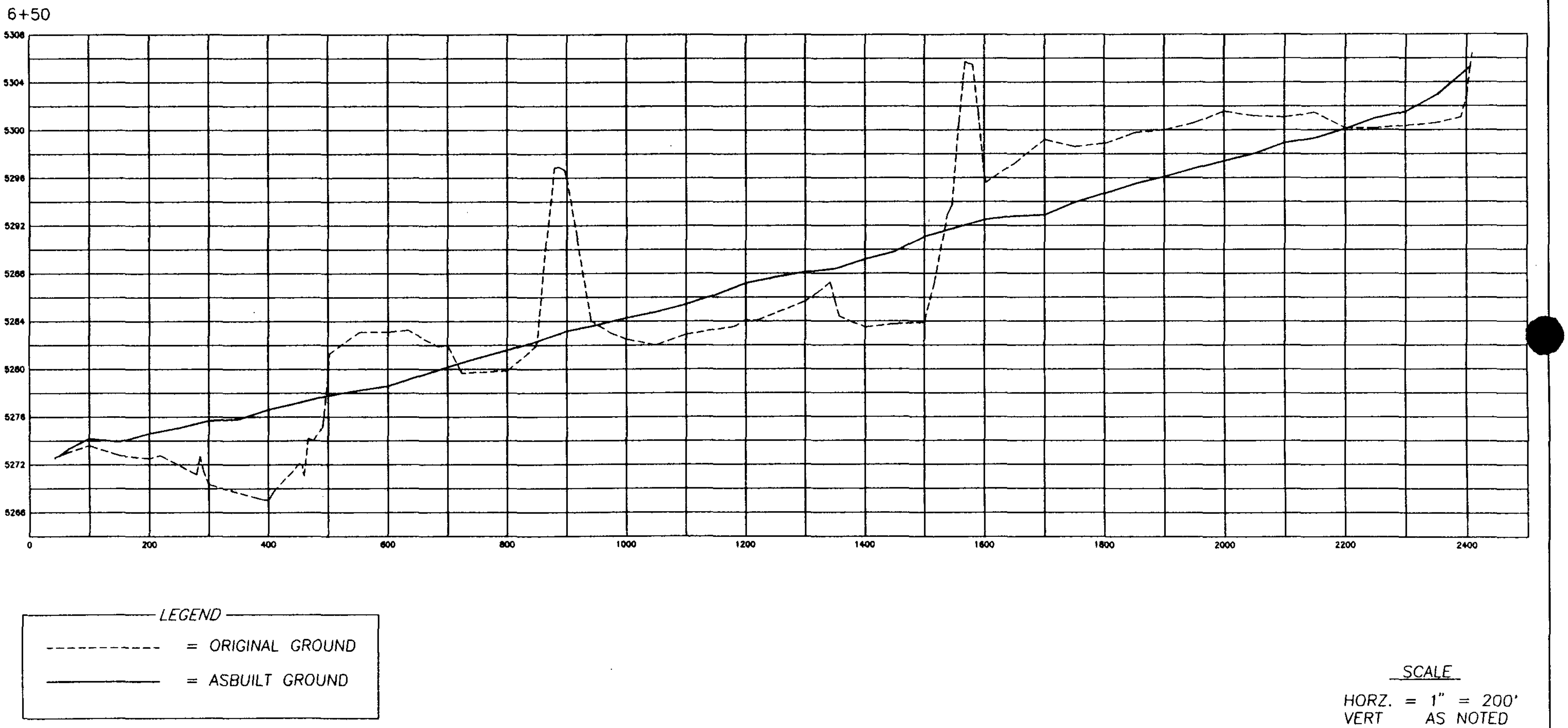
- - - - - - - = ORIGINAL GROUND

———— = ASBUILT GROUND

SCALE

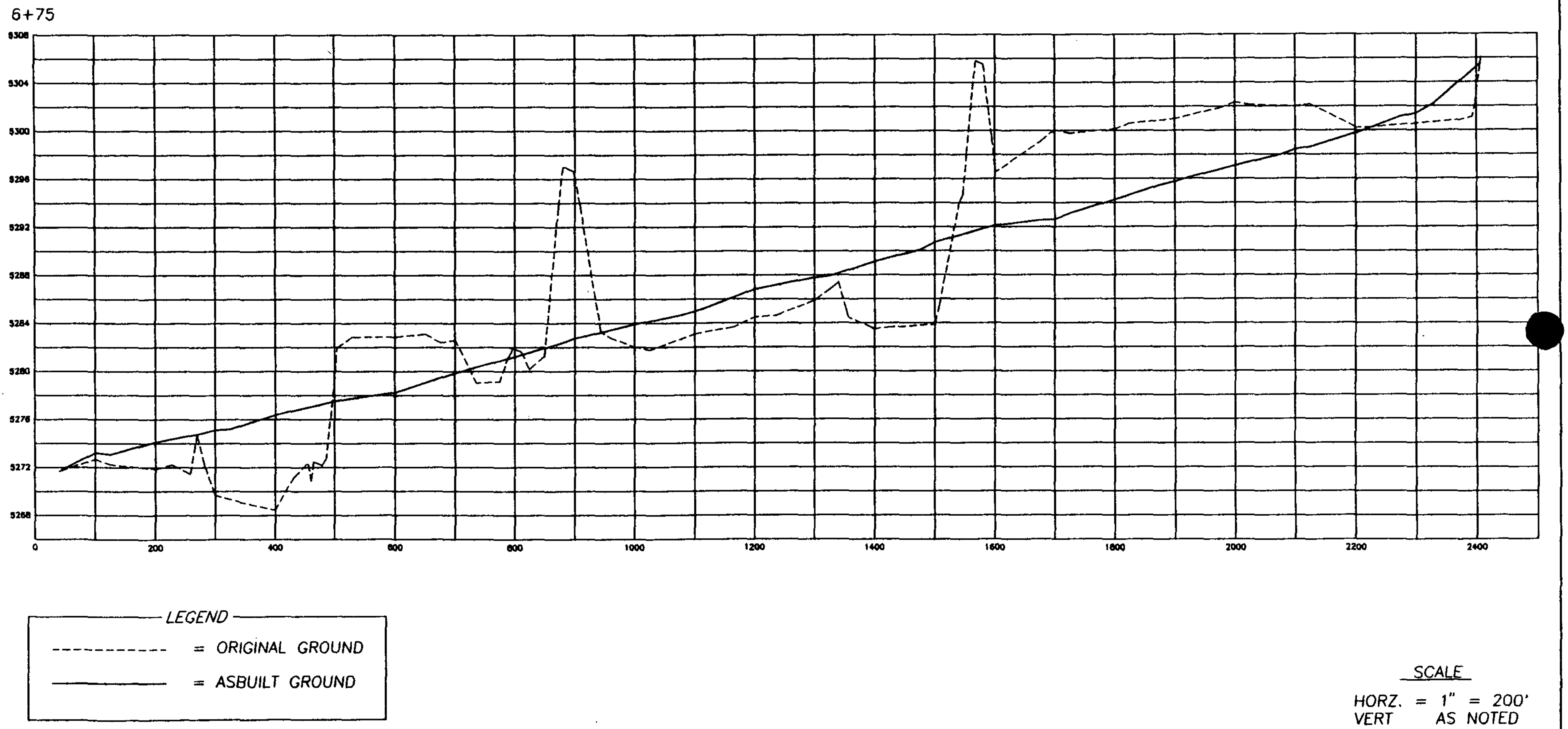
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 6+50



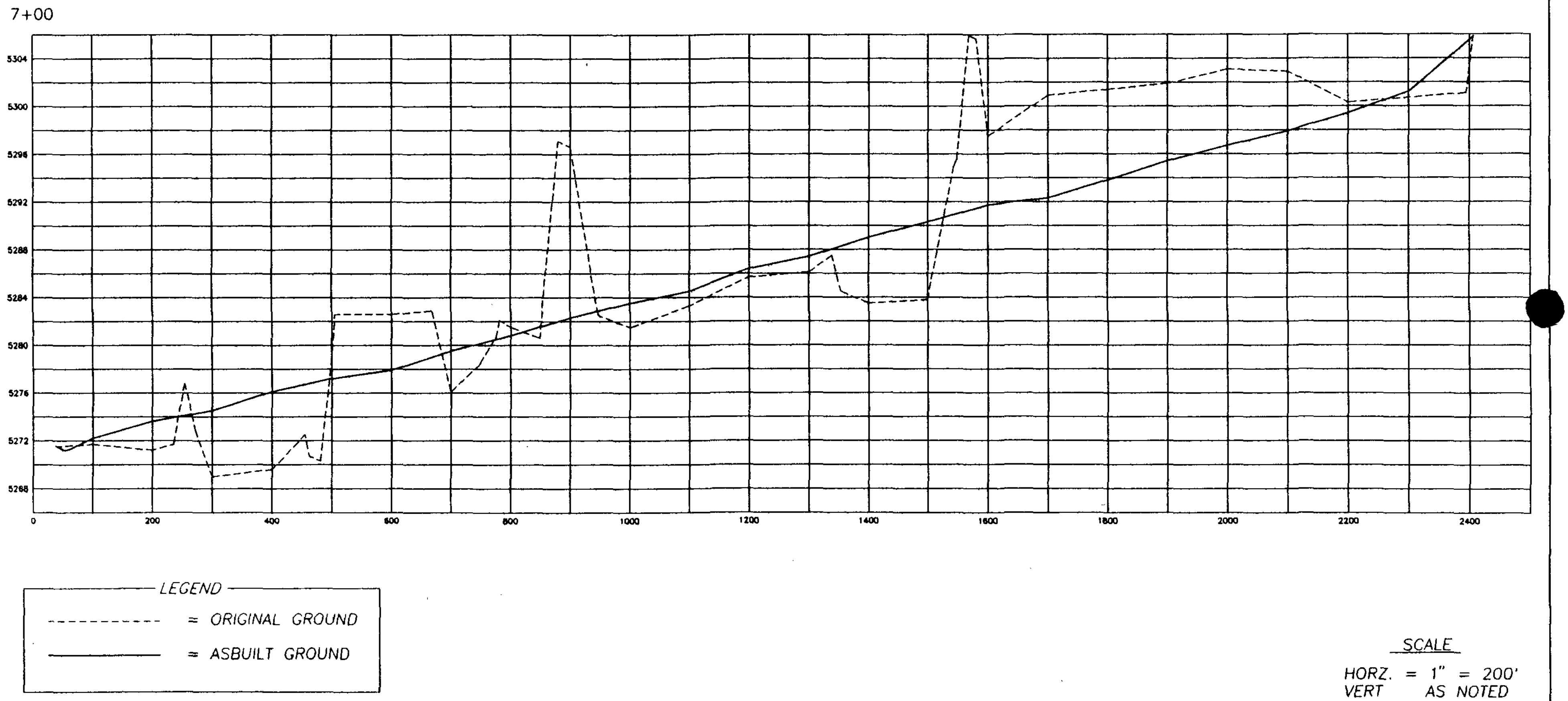
SCALE
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 6+75



SCALE
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 7+00

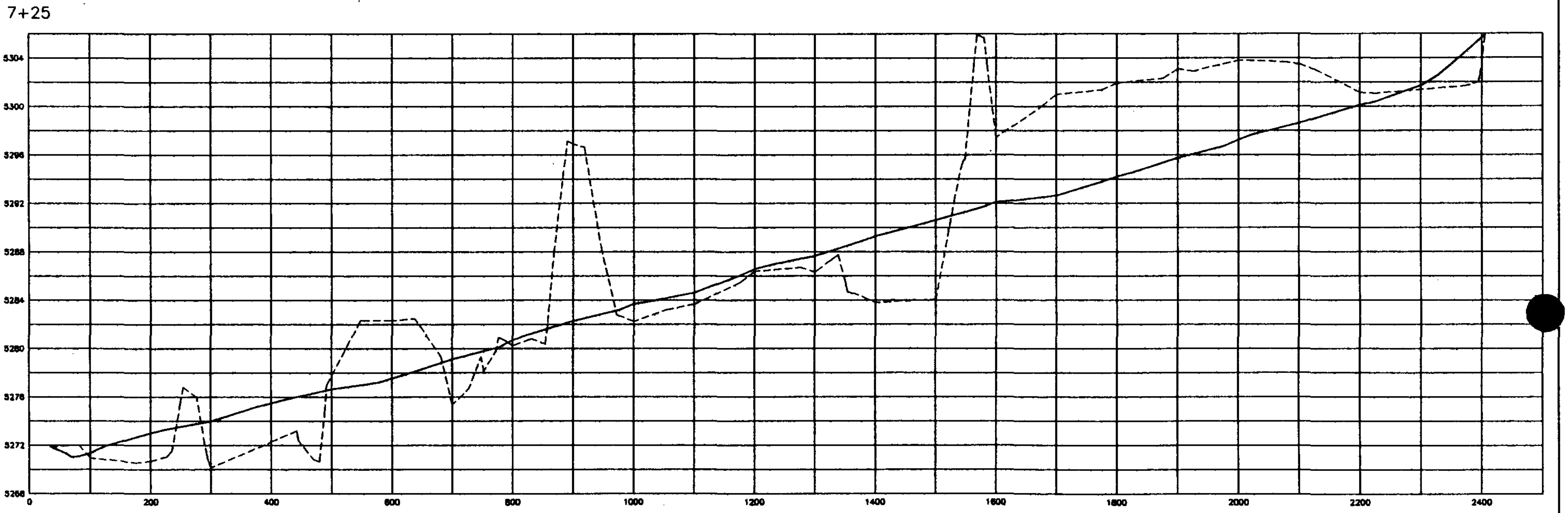


SCALE

HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure

Asbuilt X-Sections - Sta. 7+25



LEGEND

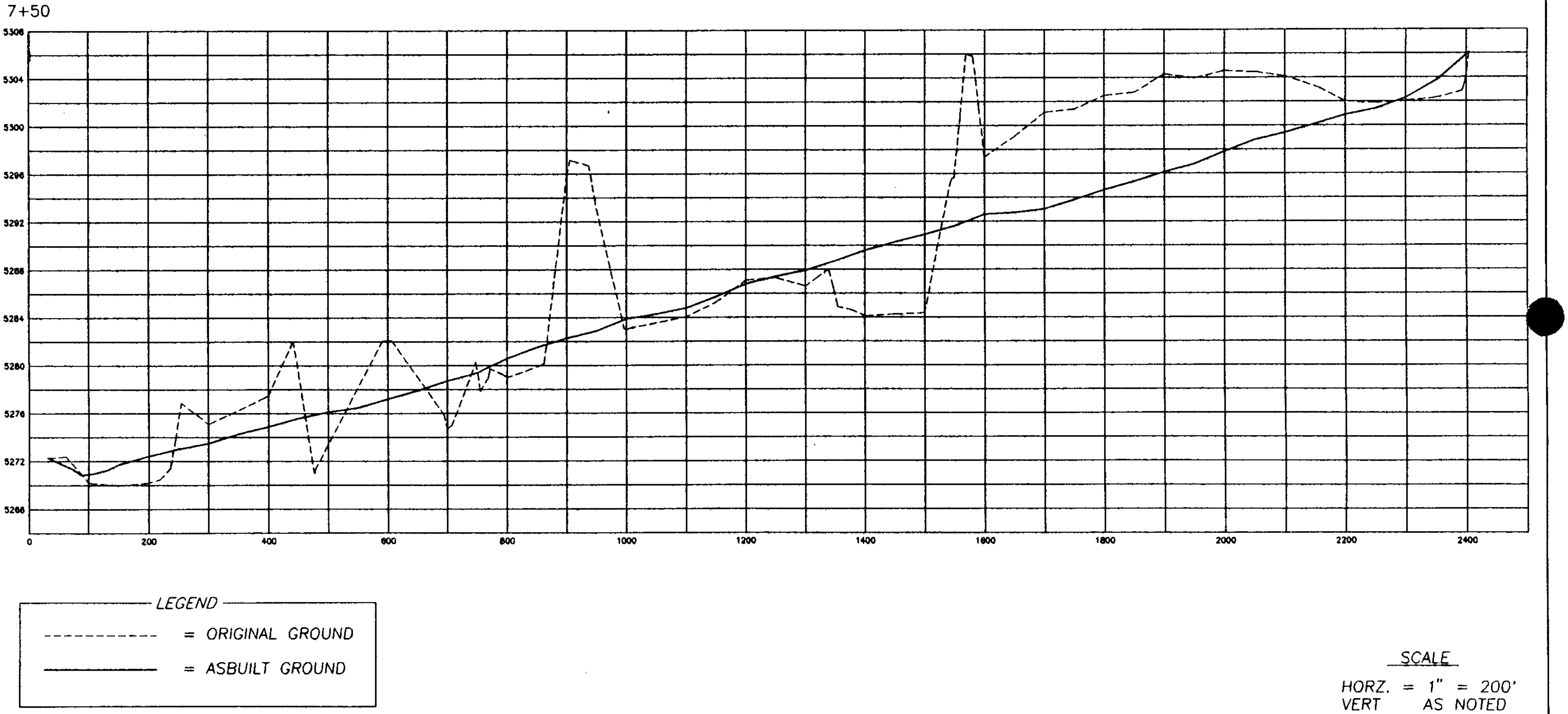
- - - - - - - - = ORIGINAL GROUND

———— = ASBUILT GROUND

SCALE

HORZ. = 1" = 200'
VERT AS NOTED

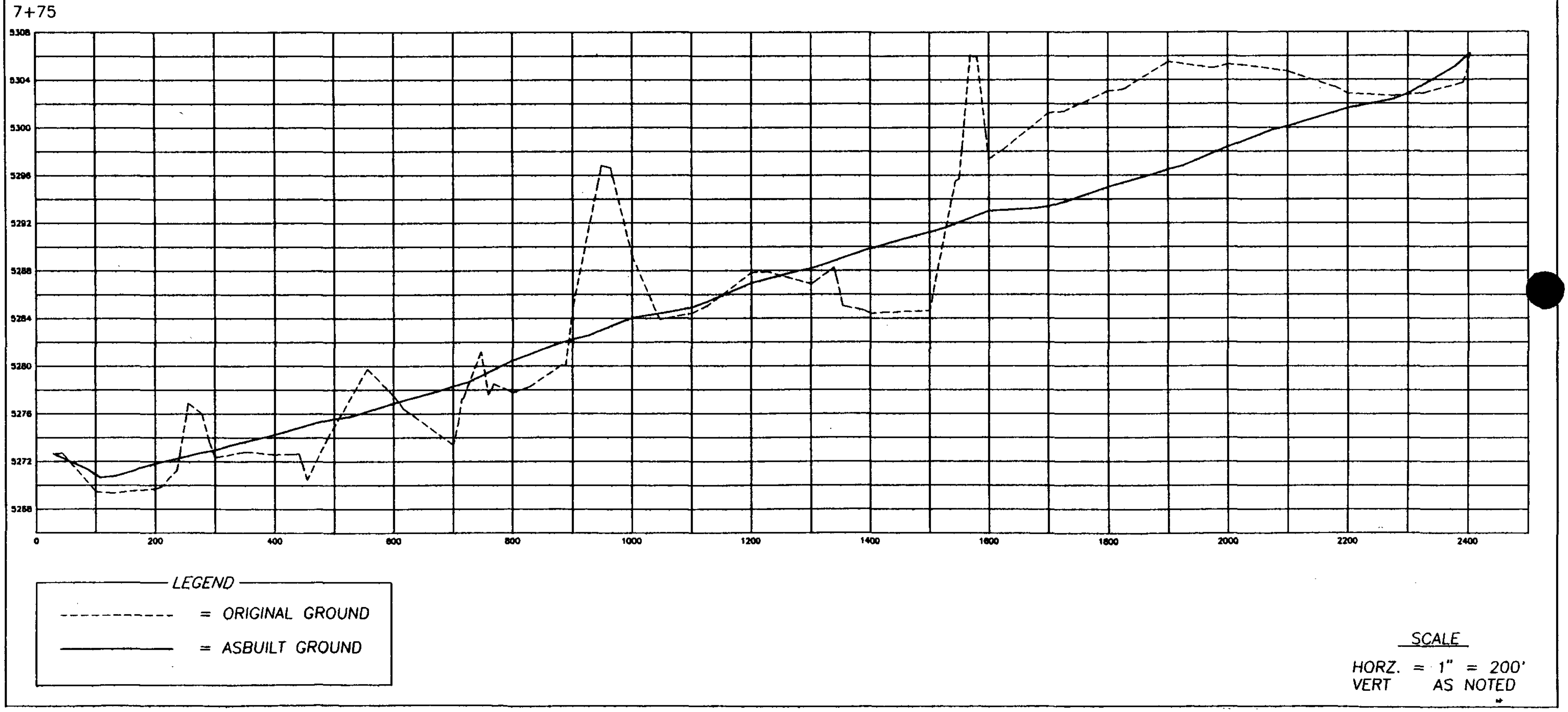
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 7+50



SCALE

HORZ. = 1" = 200'
VERT AS NOTED

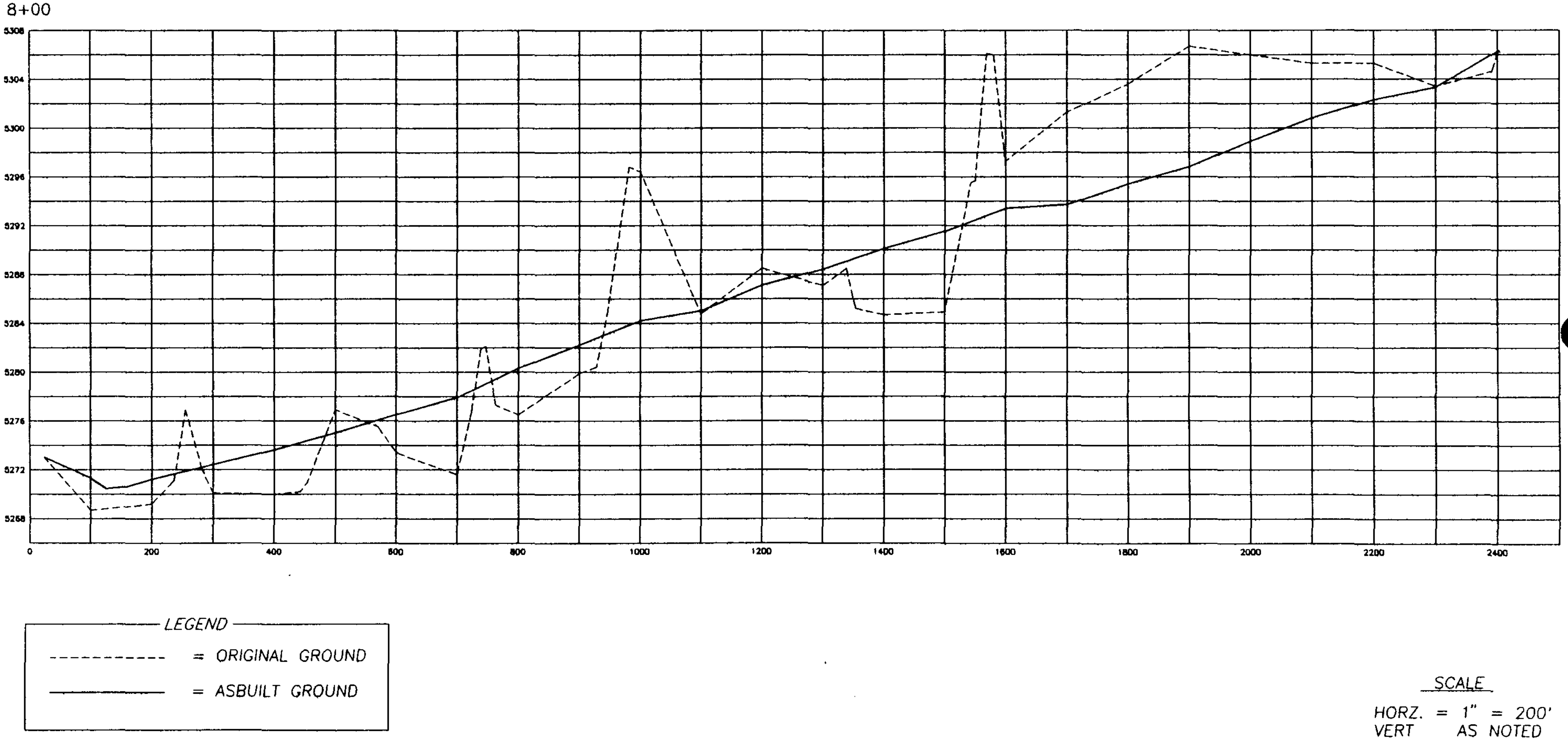
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 7+75



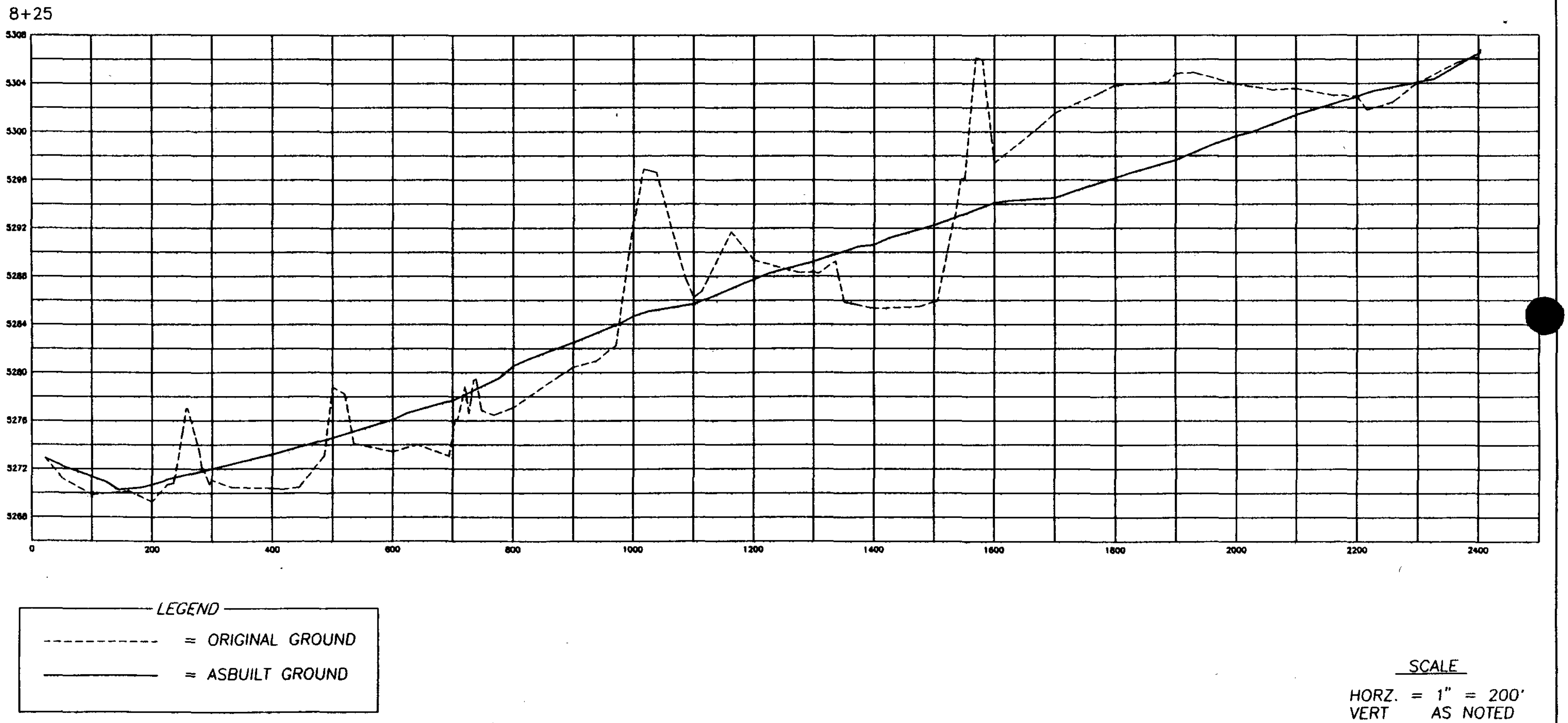
SCALE

HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 8+00



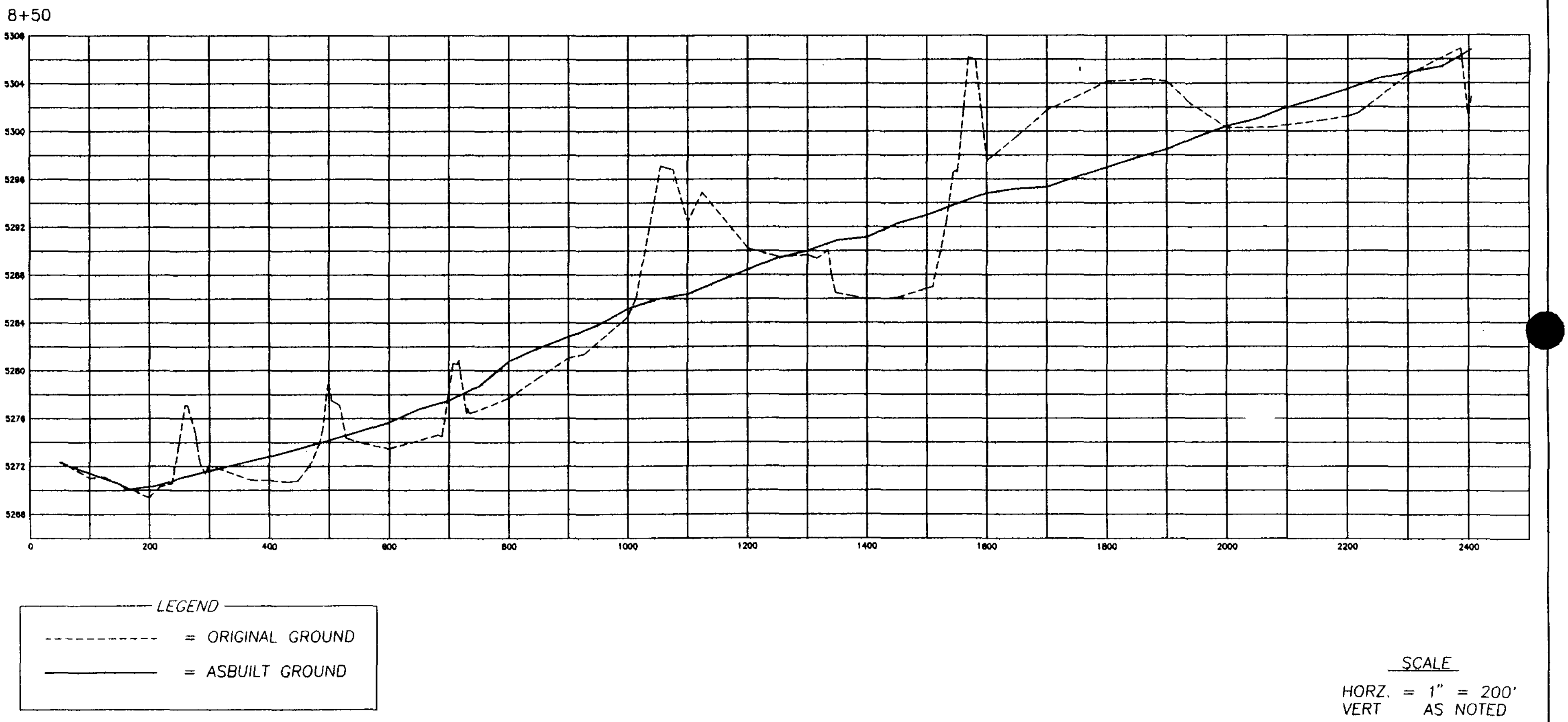
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 8+25



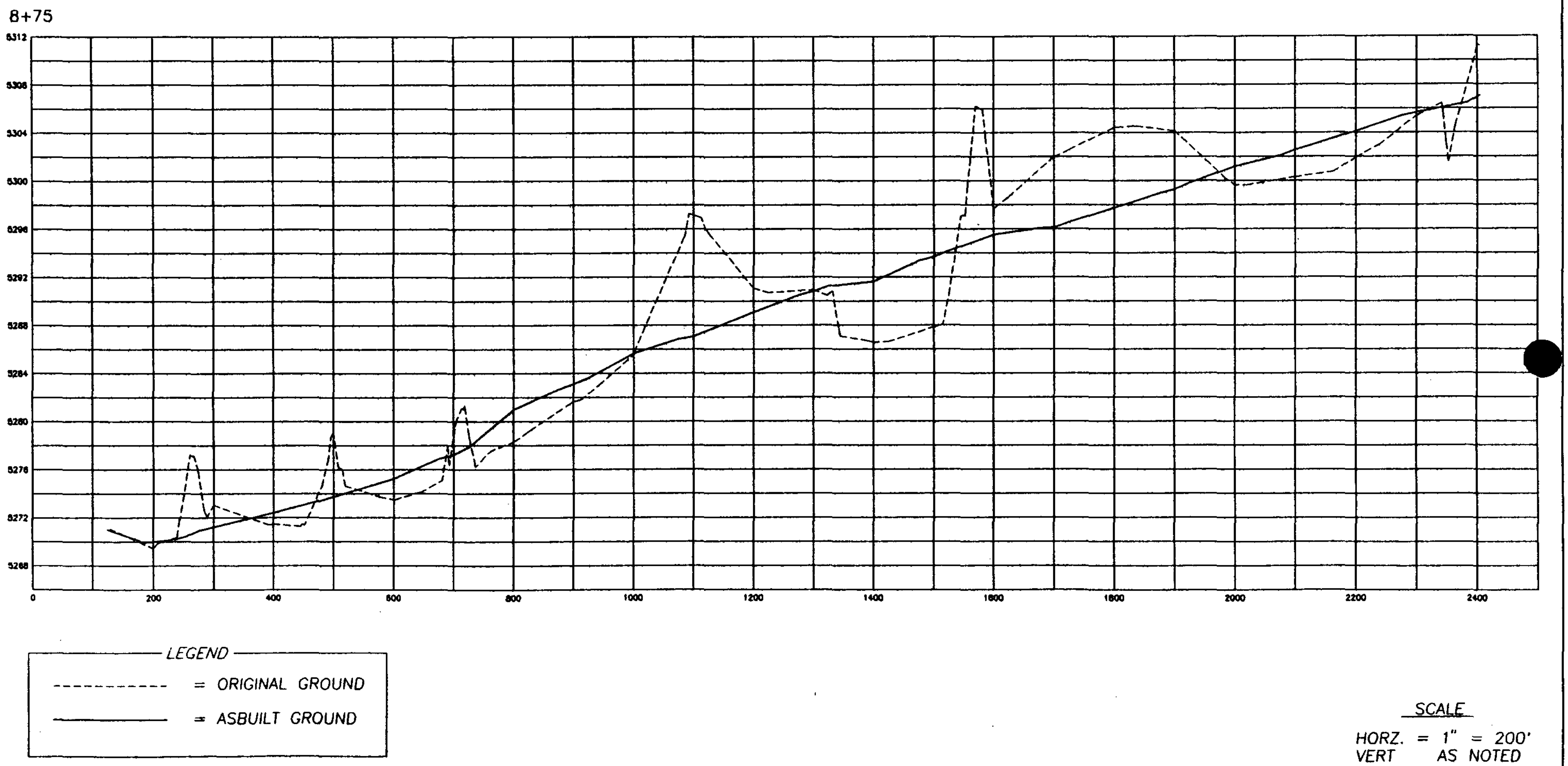
SCALE

HORZ. = 1" = 200'
VERT AS NOTED

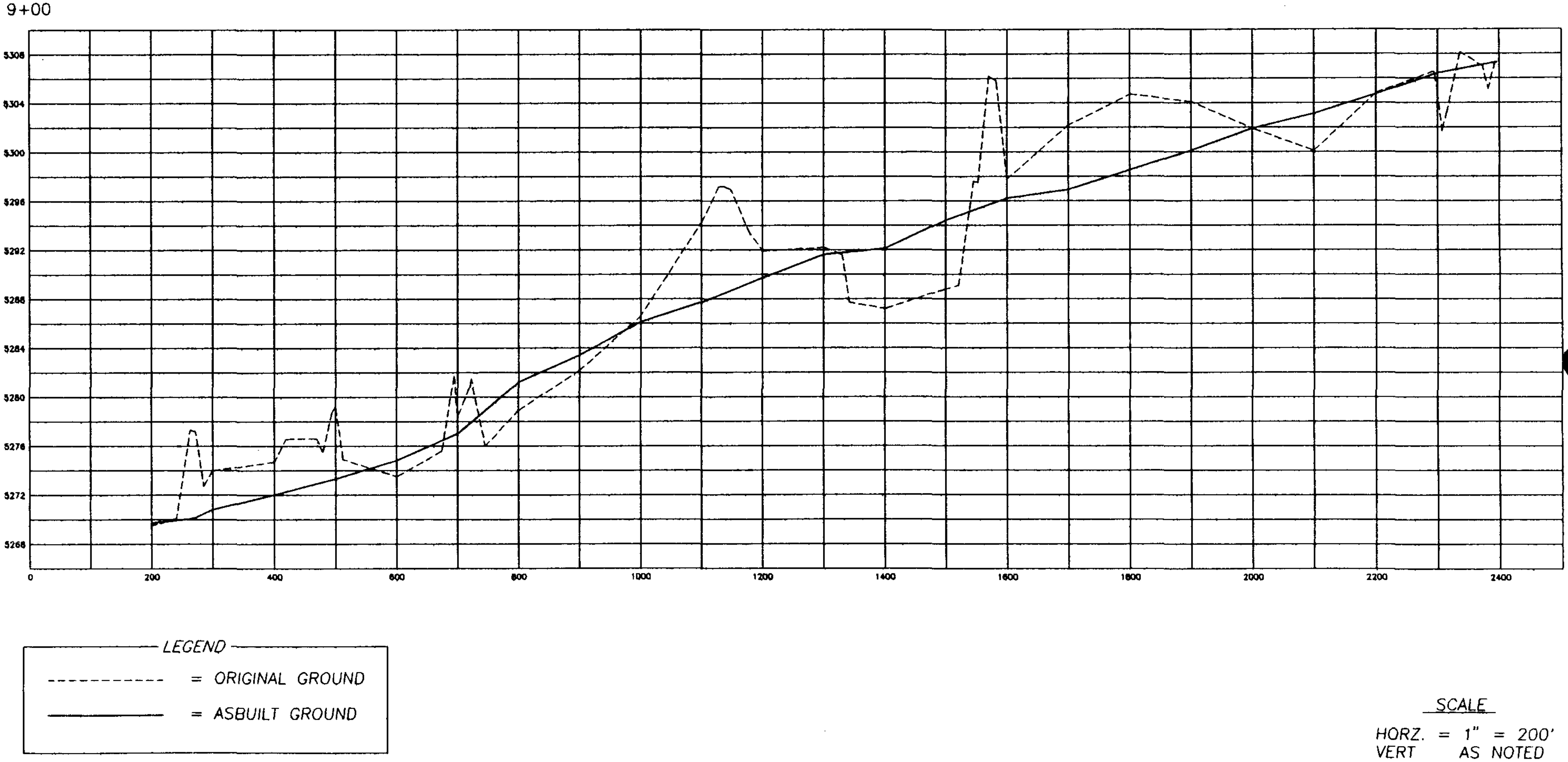
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 8+50



San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 8+75

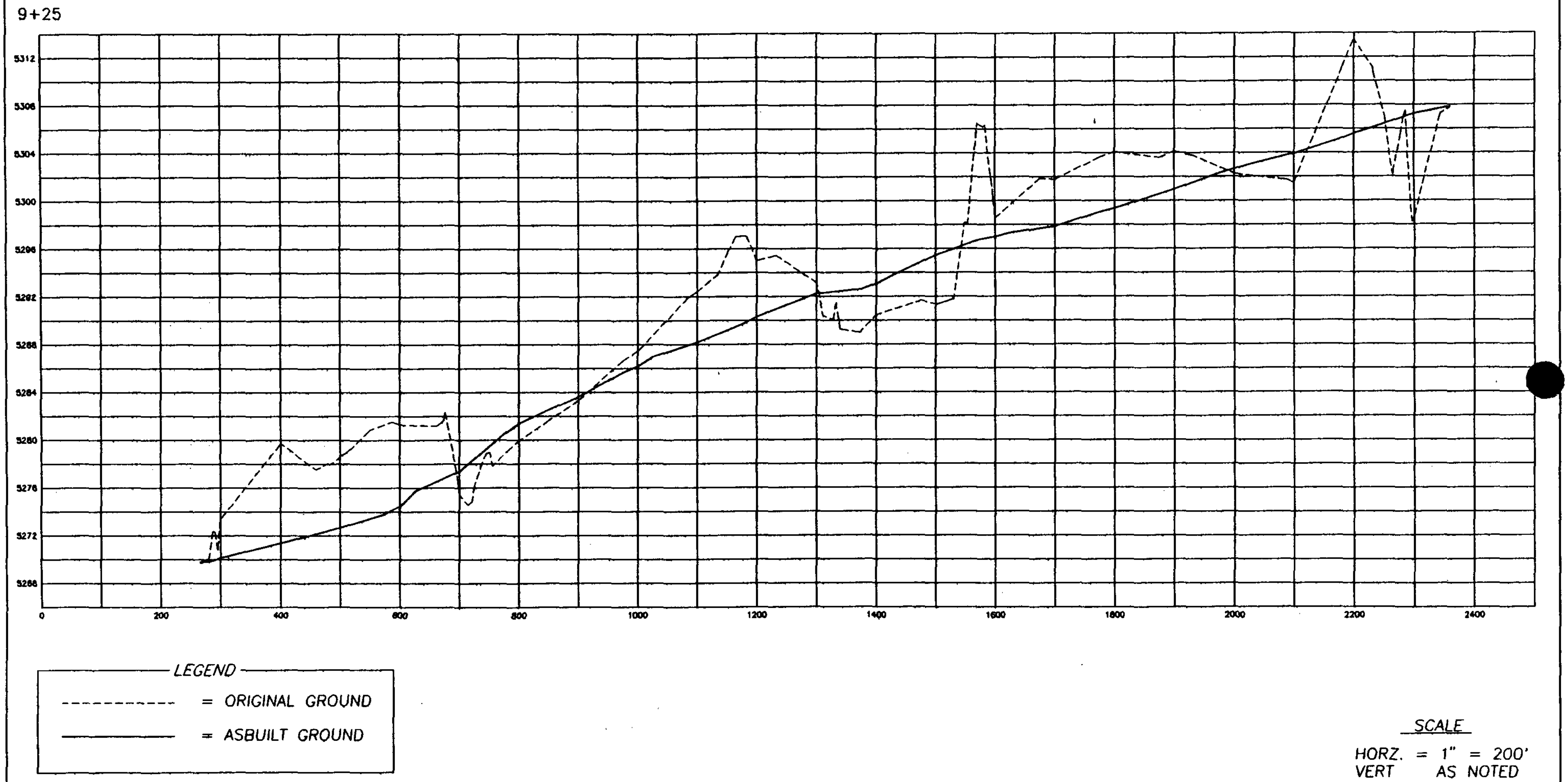


San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 9+00



SCALE
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 9+25

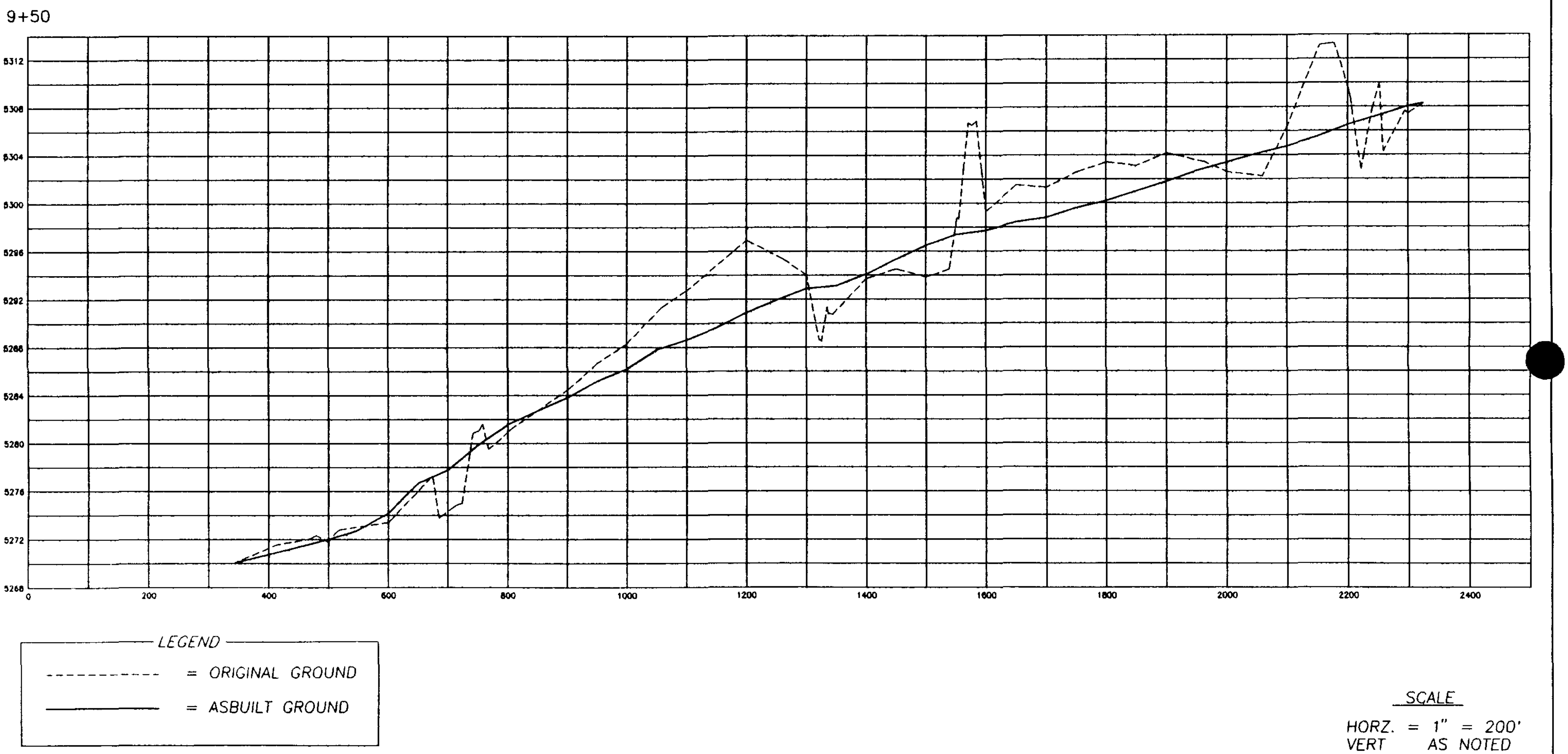


SCALE

HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure

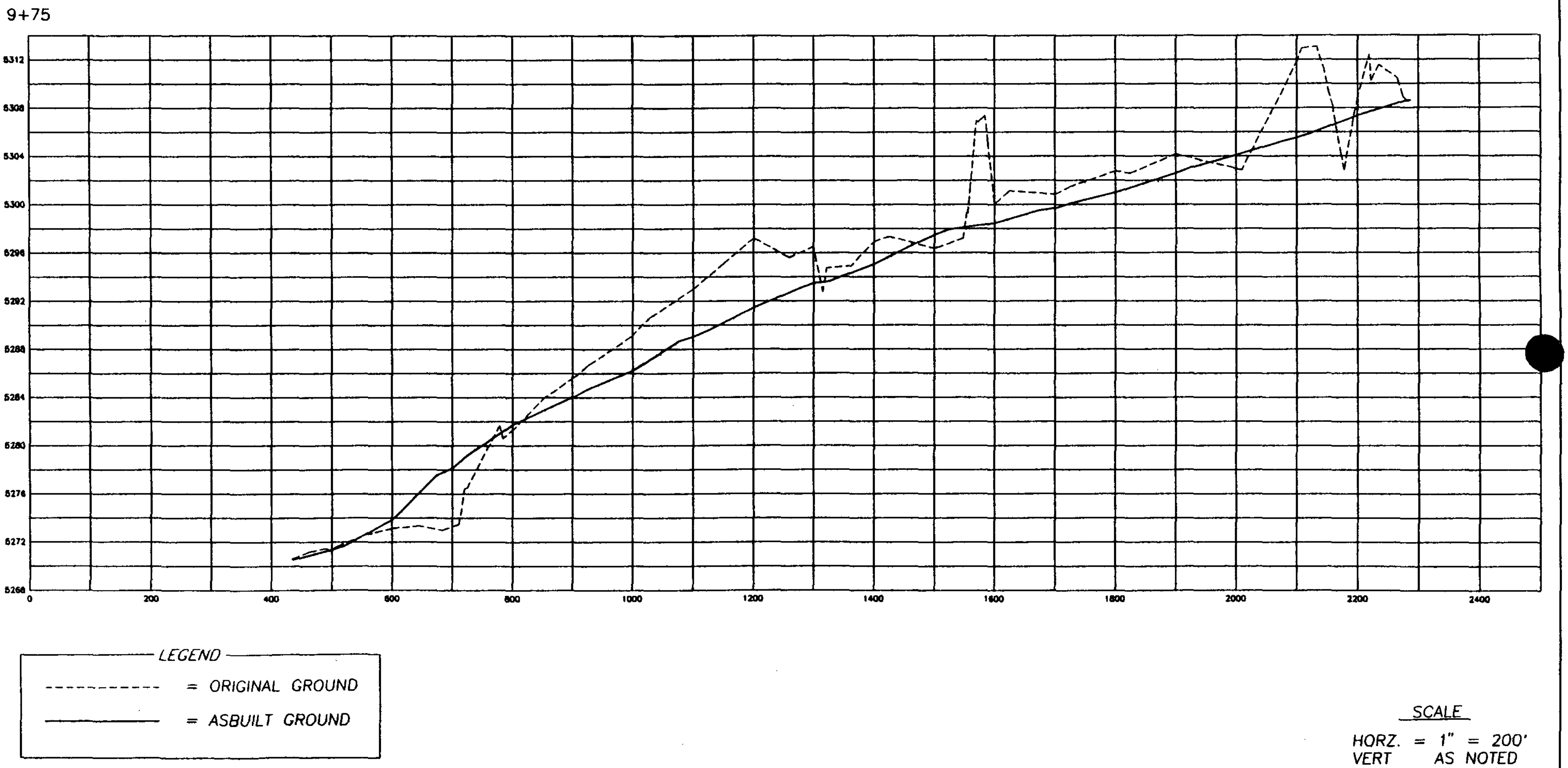
Asbuilt X-Sections - Sta. 9+50



SCALE

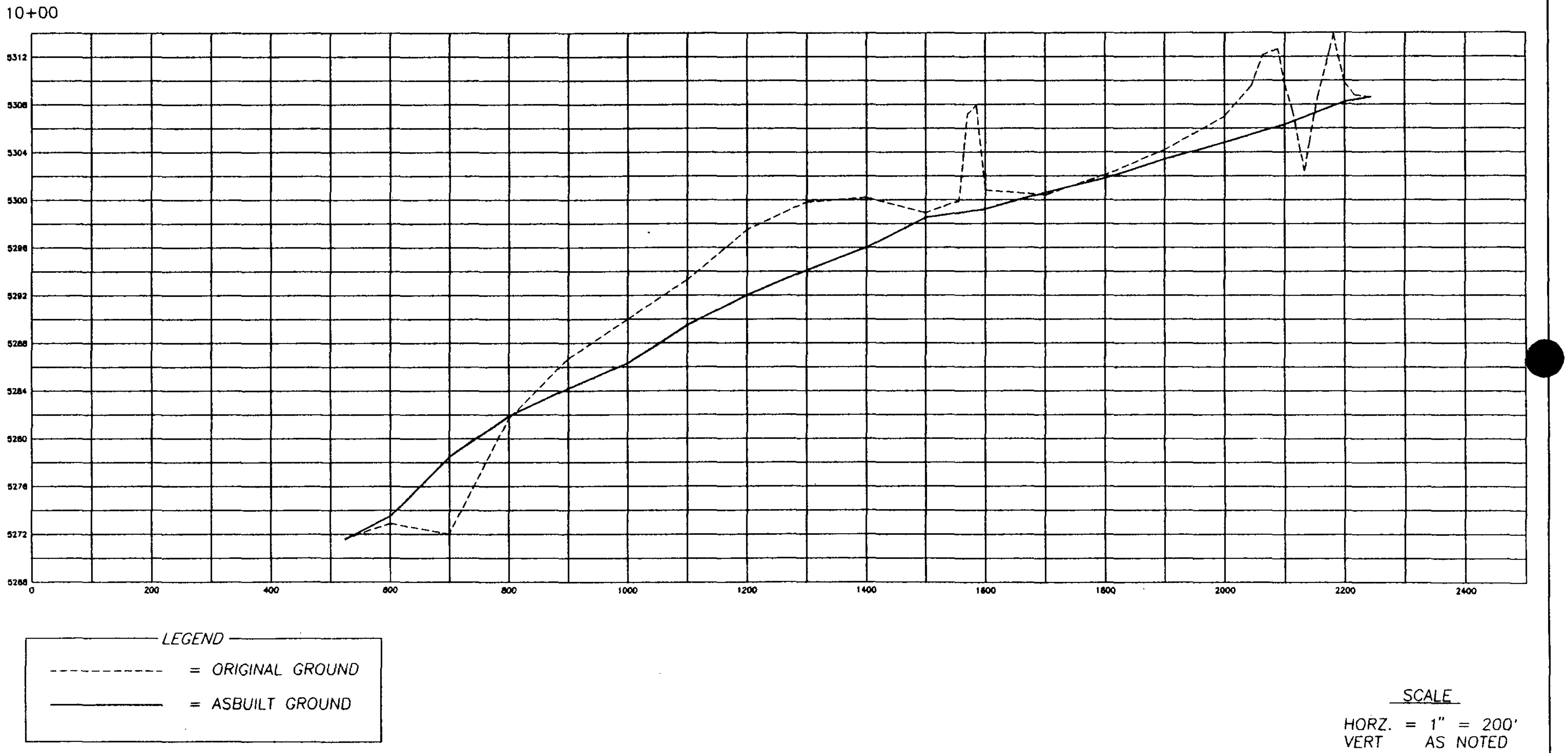
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 9+75



SCALE
HORZ. = 1" = 200'
VERT AS NOTED

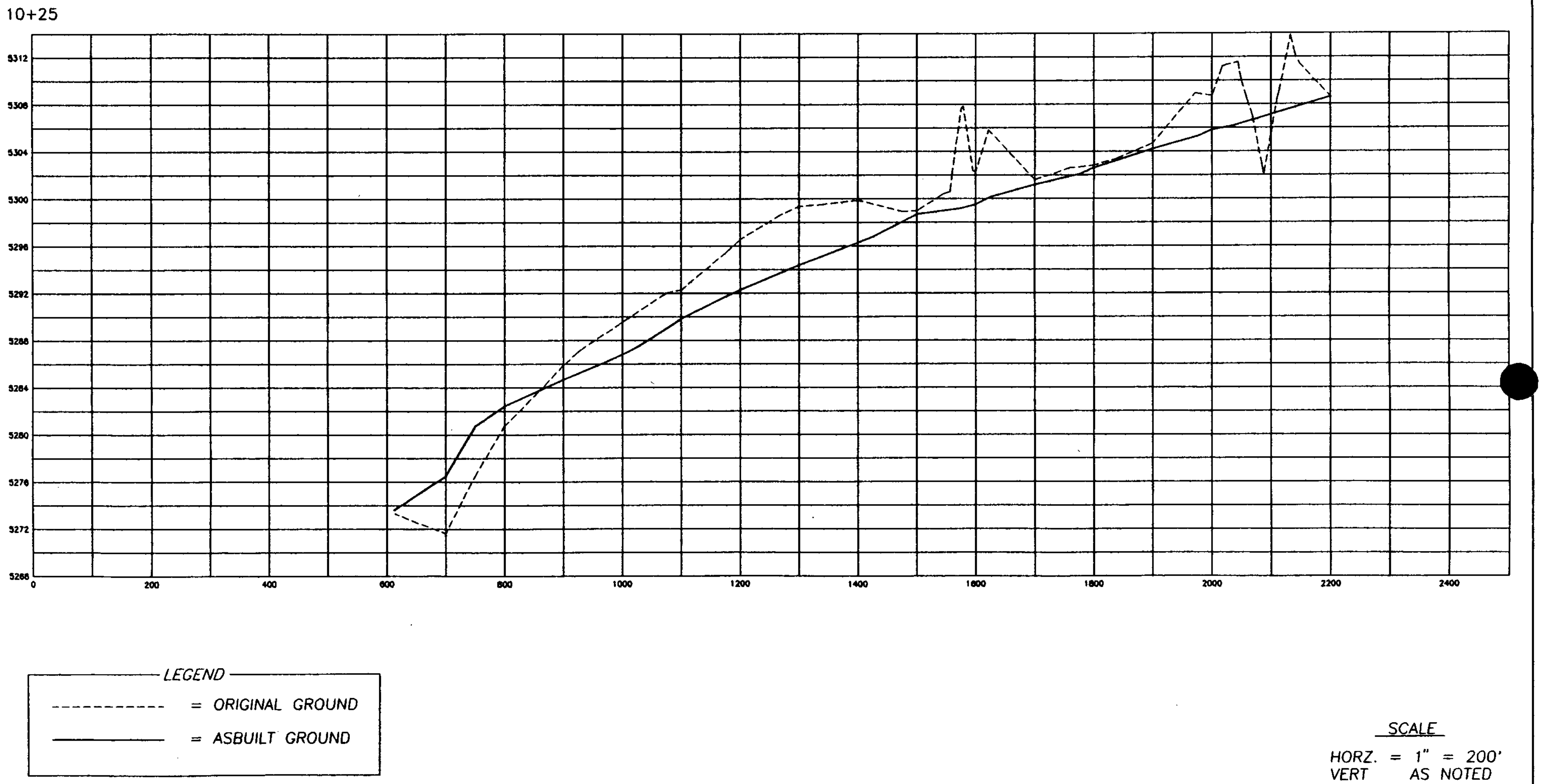
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta.10+00



SCALE

HORZ. = 1" = 200'
VERT AS NOTED

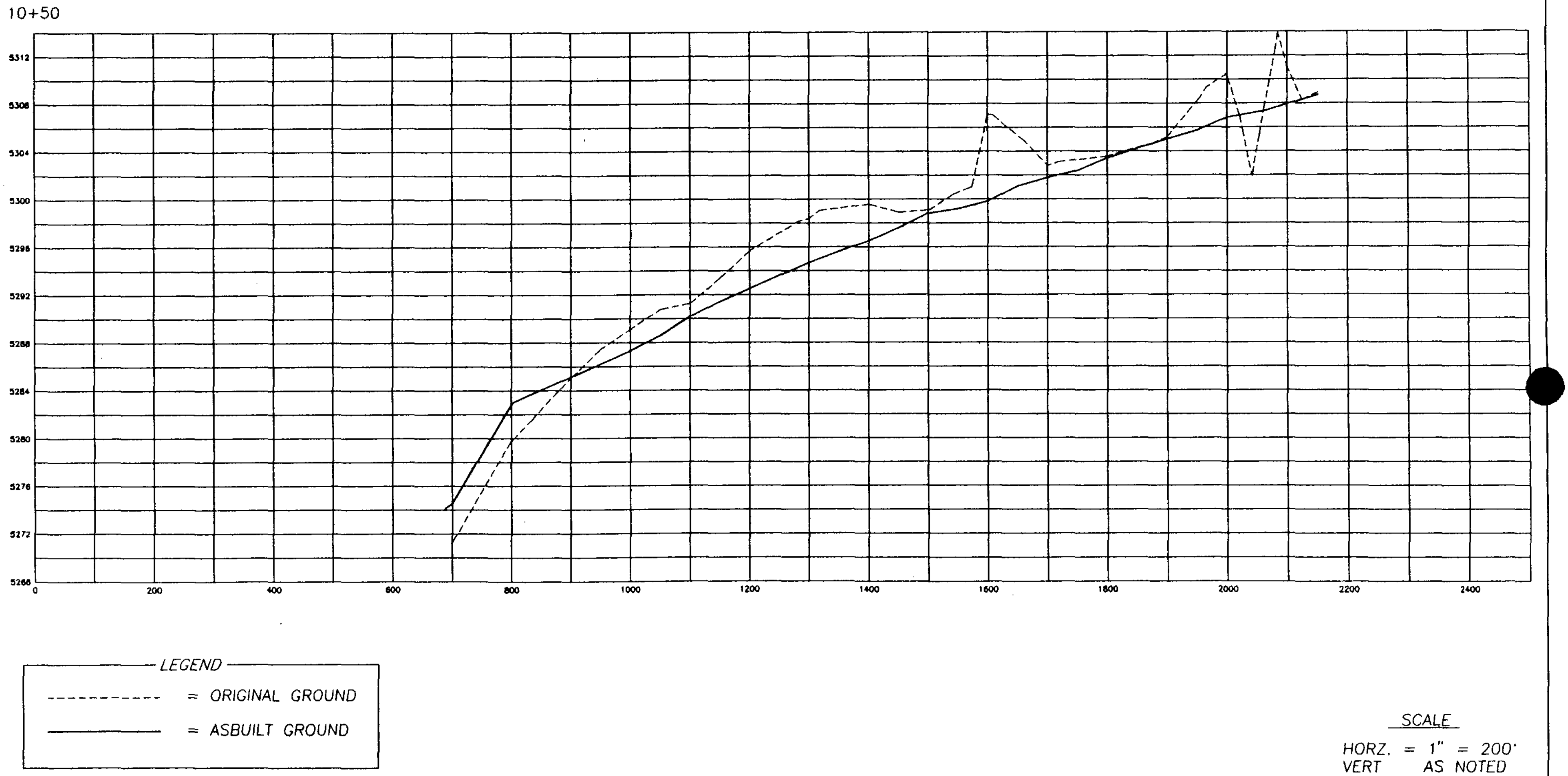
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta.10+25



SCALE

HORZ. = 1" = 200'
VERT AS NOTED

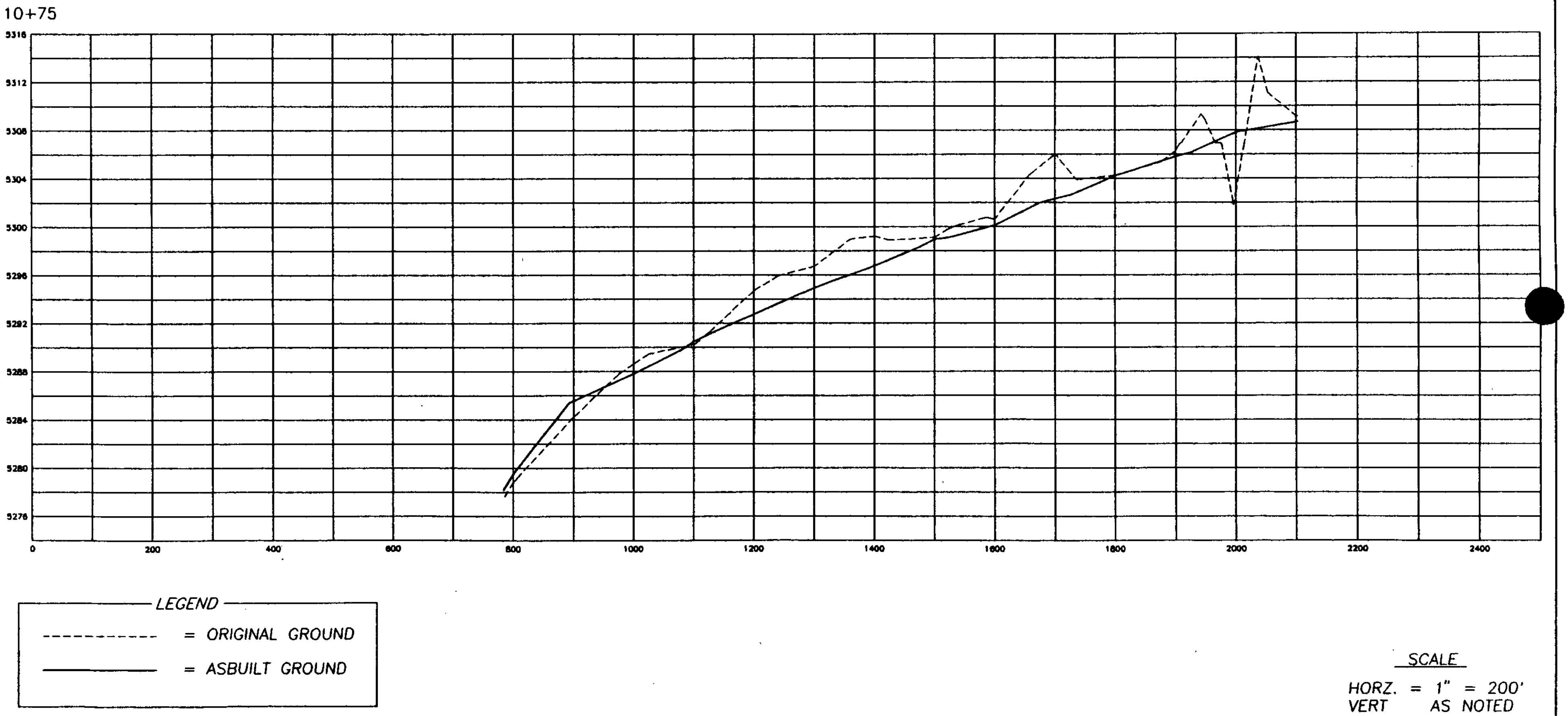
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 10+50



SCALE

HORZ. = 1" = 200'
VERT AS NOTED

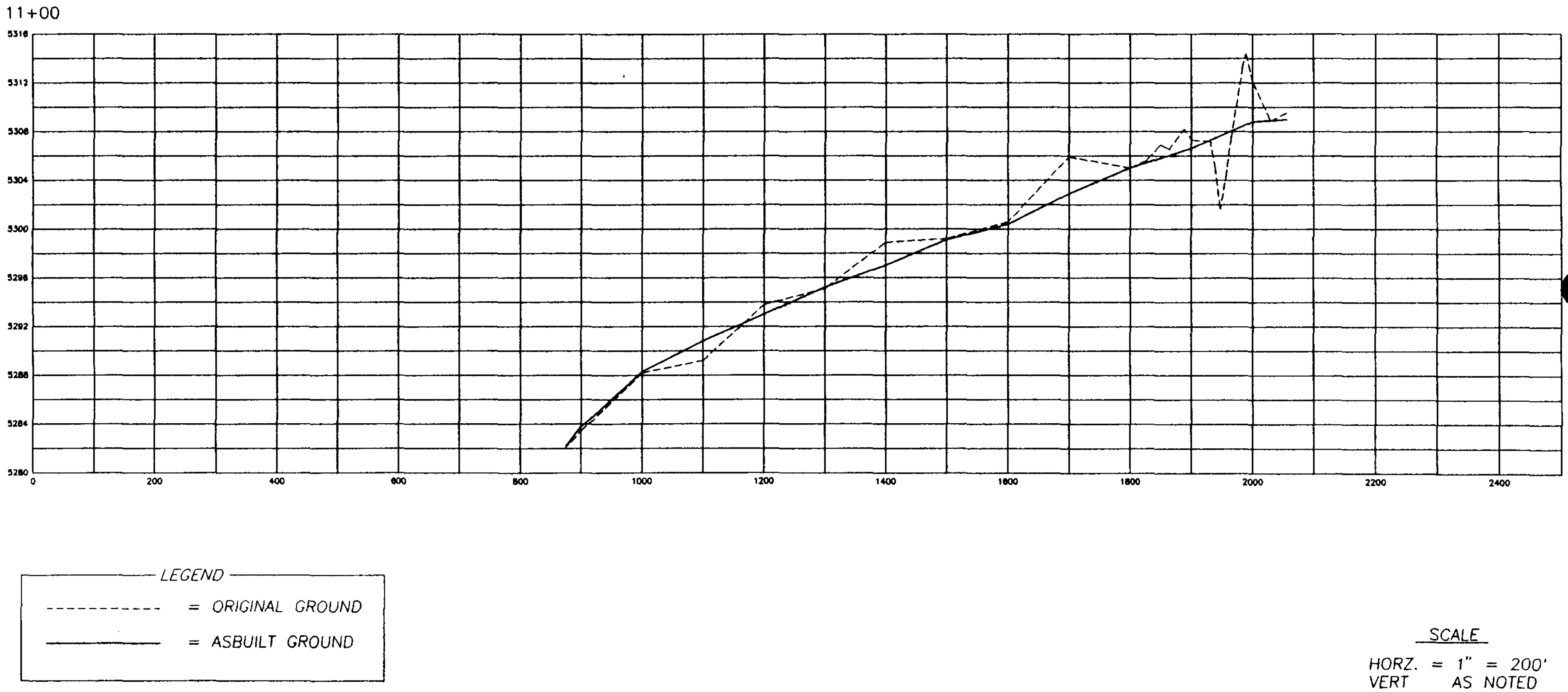
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 10+75



SCALE

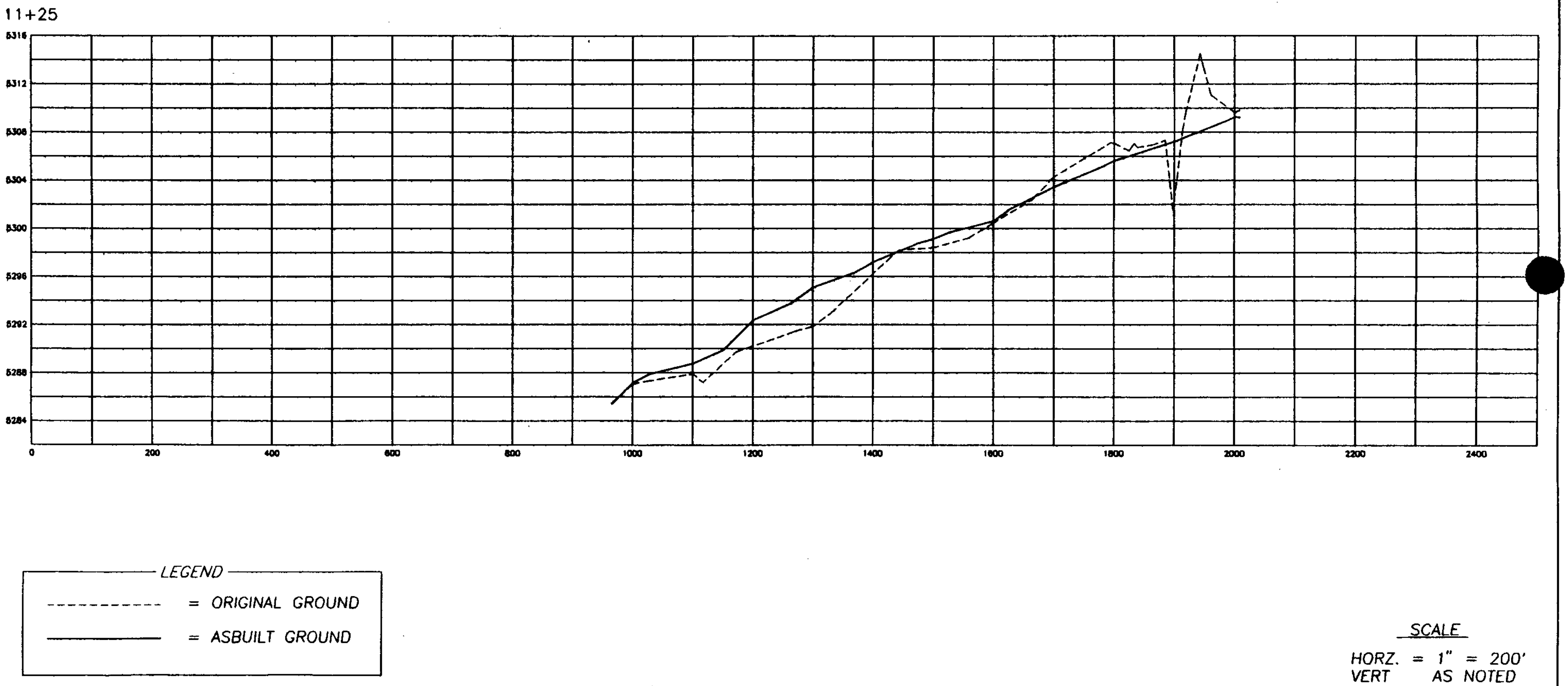
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 11+00



SCALE
HORZ. = 1" = 200'
VERT AS NOTED

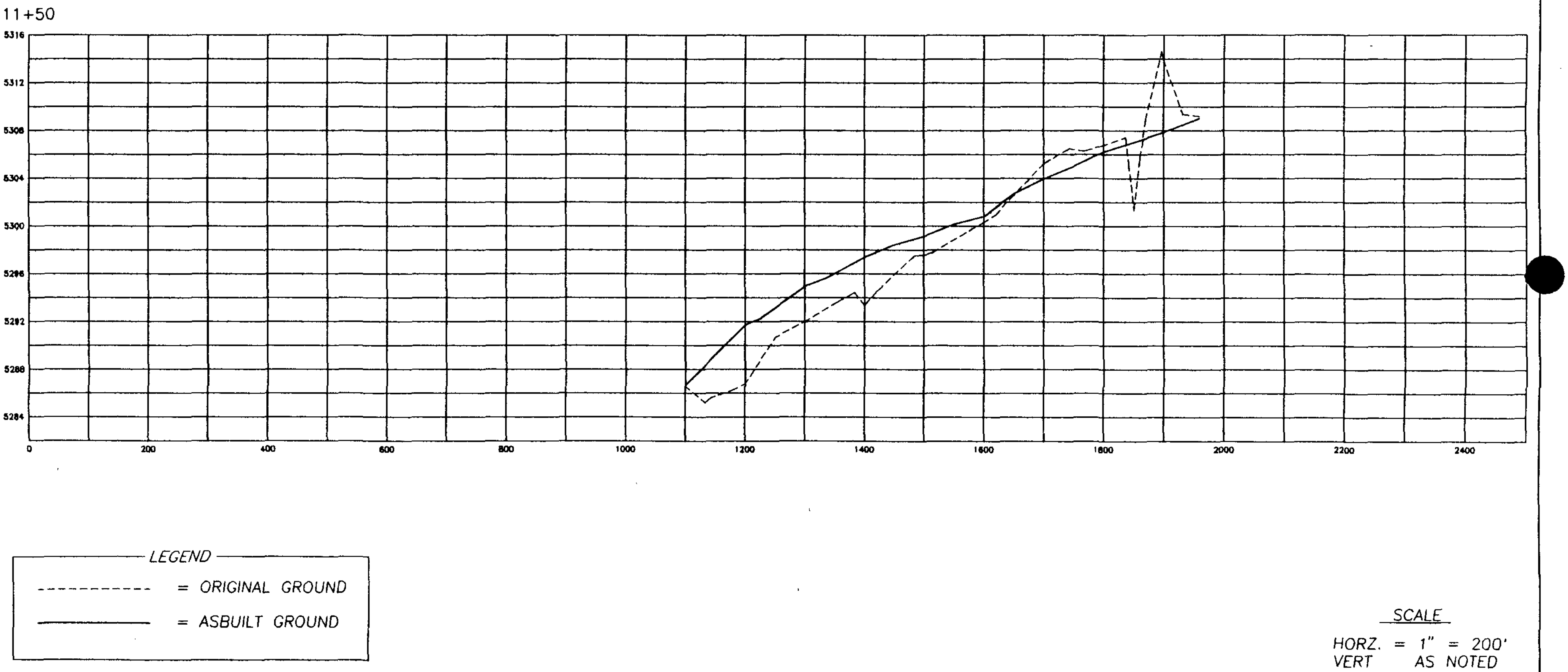
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 11+25



SCALE

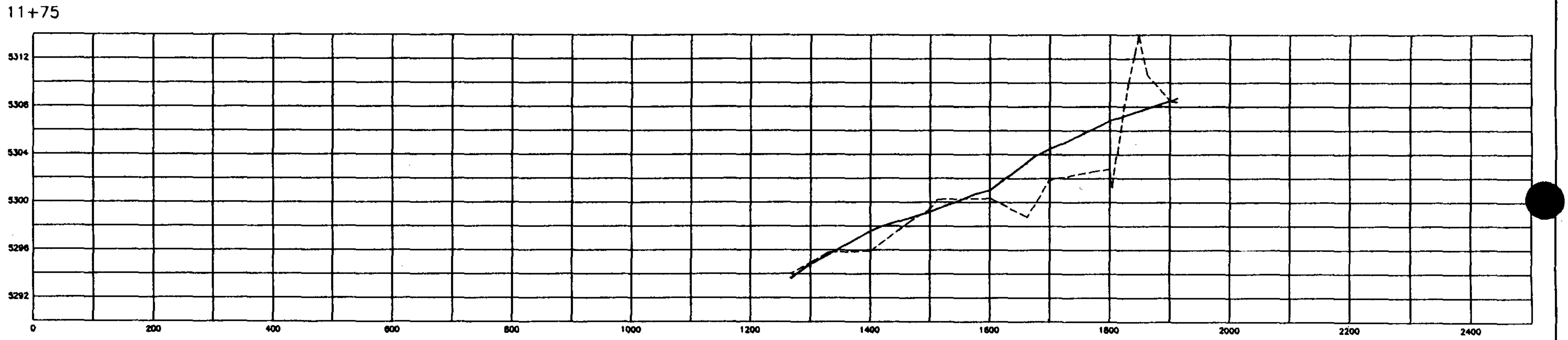
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 11+50



SCALE
HORZ. = 1" = 200'
VERT AS NOTED

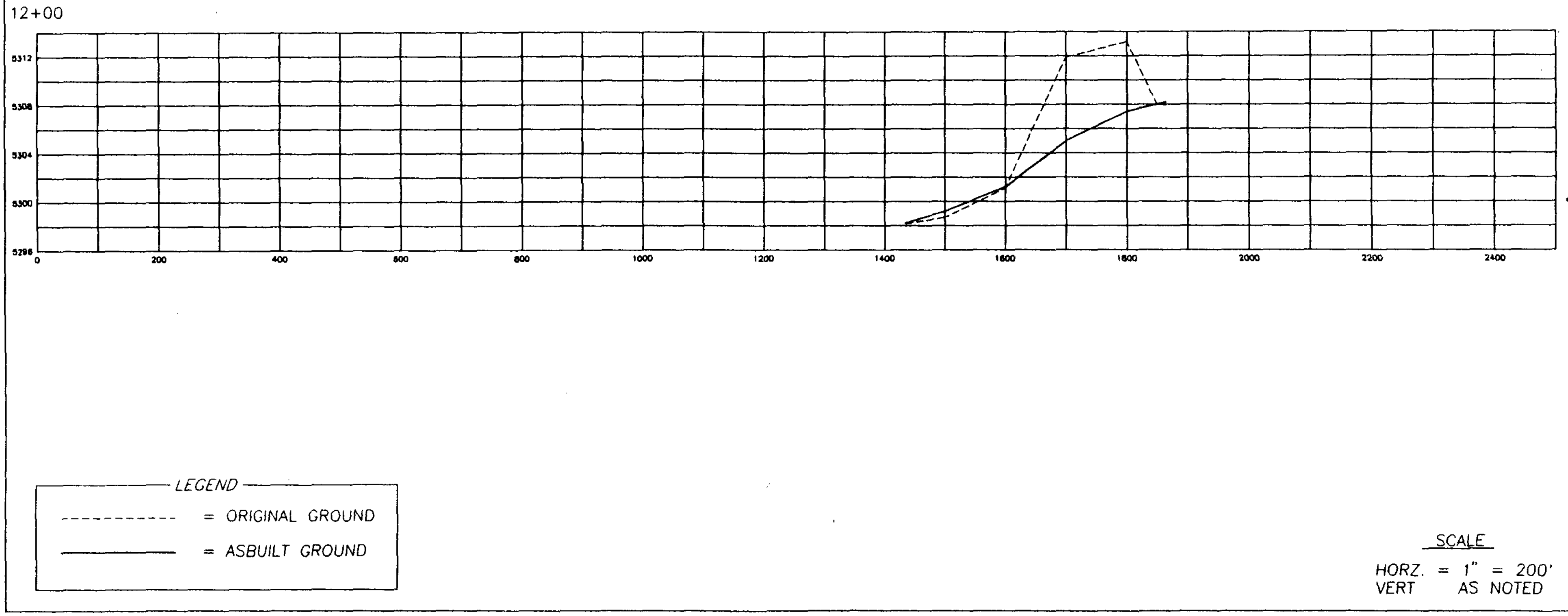
San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 11+75



LEGEND
- - - - - - - = ORIGINAL GROUND
——————— = ASBUILT GROUND

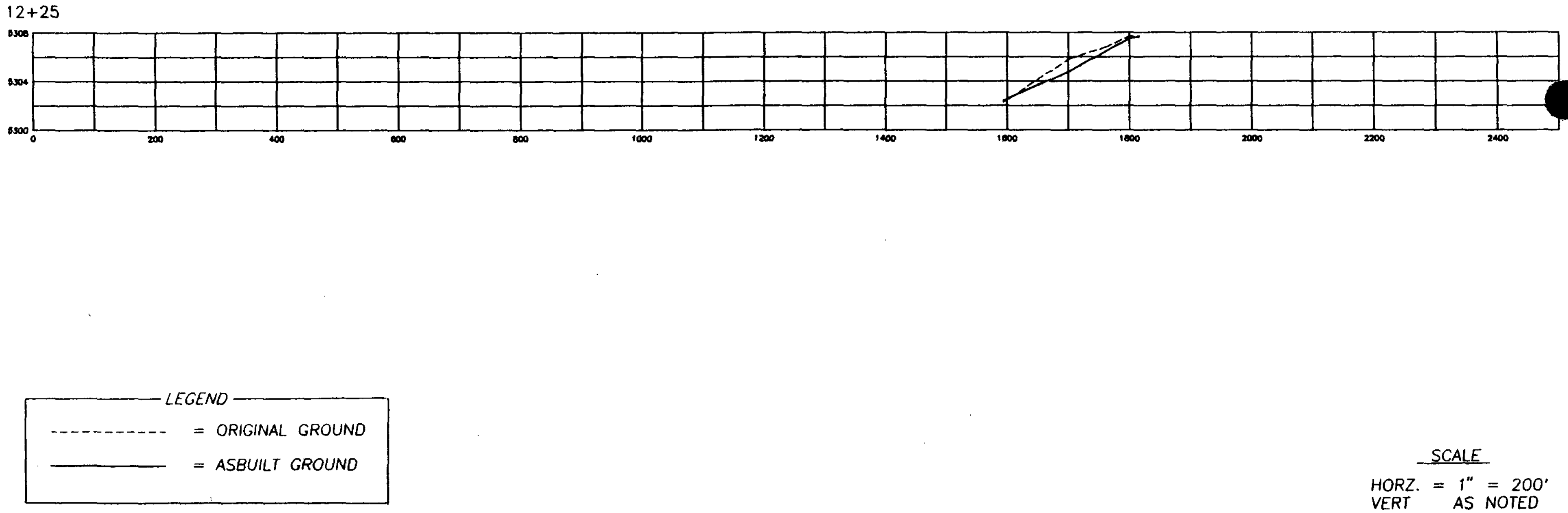
SCALE
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 12+00



SCALE
HORZ. = 1" = 200'
VERT AS NOTED

San Juan Plant Pond Closure
Asbuilt X-Sections - Sta. 12+00



SCALE
HORZ. = 1" = 200'
VERT AS NOTED

RECEIVED

SEP 17 1991

OIL CONSERVATION DIV.
SANTA FE

El Paso
Natural Gas Company

EM38 ISOPLETH LINES.

PROJECT: 63715 (EPNG–SJ)
LOCATION: SAN JUAN RIVER PLANT

K.W. BROWN
&
ASSOCIATES, INC.

DATE: 12\15\85
FIGURE: 2
SCALE: SHOWN

State of New Mexico
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT
Santa Fe, New Mexico 87505

OIL CONSERVATION DIVISION

New Mexico DRUG FREE It's a State of Mind!

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

MATTHEW BACA
DEPUTY SECRETARY

November 18, 1991

CERTIFIED MAIL
RETURN RECEIPT NO. P-690-155-081

Mr. Thomas D. Hutchins
North Region Compliance Manager
El Paso Natural Gas Company
P.O. Box 1492
El Paso, Texas 79978

Re: Pond and Pit Closure
San Juan River Gas Processing Plant
San Juan County, New Mexico

Dear Mr. Hutchins:

The Oil Conservation Division (OCD) has received your correspondence, dated November 1, 1991, summarizing the October 24, 1991 meeting concerning the San Juan River Plant Pond and Pit Closure Plan. The OCD concurs with EPNG's summary of the meeting.

The correspondence also includes an addendum to the pond and pit closure plan. The addendum is acceptable with the following exceptions:

1. EPNG has proposed to use the areas of borrow soil numbers 1 & 3 as landfarms for the soils excavated from the north and south flare pit respectively. It is OCD policy to restrict any landfarming in areas where the depth to ground water is less than 100 feet, unless positive protection is in place to prevent the possibility of contaminants reaching the ground water. Please supply information on how EPNG proposes to prevent contaminant migration from the landfarm areas.

VILLAGRA BUILDING - 408 Galisteo
Forestry and Resources Conservation Division
P.O. Box 1948 87504-1948
827-5830
Park and Recreation Division
P.O. Box 1147 87504-1147
827-7465

2040 South Pacheco
Office of the Secretary
827-5950
Administrative Services
827-5925
Energy Conservation & Management
827-5900
Mining and Minerals
827-5970

LAND OFFICE BUILDING - 310 Old Santa Fe Trail
Oil Conservation Division
P.O. Box 2088 87504-2088
827-5800

2. Borrow area #1 is in a potential drainage area. What preventative measures are proposed to prevent all run-on and run-off from rainfall events?

3. Operating procedures for the landfarm areas were omitted from the plan. Please supply these procedures.

4. A report containing the results of the closure will be submitted to the OCD within 60 days of completion of the closure activities.

Please contact the OCD at least one week prior to commencement of work to afford the OCD the opportunity to have a representative present to witness the work and/or split samples.

Please be advised that OCD approval of this plan does not limit you to the work proposed should the remediation activities fail to effectively mitigate the contamination.

If you have any questions, please call me at (505) 827-5812 or Bill Olson at (505) 827-5885.

Sincerely,

Roger C Anderson

Roger C. Anderson
Acting Bureau Chief

xc: OCD Aztec Office

El Paso
Natural Gas Company

P. O. BOX 1492
EL PASO, TEXAS 79978
PHONE: 915-541-2600

OIL CONSERVATION DIVISION
RECEIVED
'91 NOV 4 AM 9 06

November 1, 1991

Mr. Roger Anderson
Acting, Environmental Bureau Chief
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504

Dear Mr. Anderson:

On October 24, 1991 El Paso Natural Gas Co. (EPNG) met with you and William Olson to discuss our San Juan River Plant Pond and Pit Closure Plan. Several questions that the New Mexico Oil Conservation Division (NMOCD) had asked in a September 30, 1991 letter with regard to the plan were addressed at that time.

As a follow up to the meeting and a documented response to the questions, listed below are the issues that were discussed.

1. EPNG plans to keep the pump-back system in operation as an active unit during the closure process. Upon completion of the project, the pump-back pond would be closed. If the pond should need dewatering, EPNG would transfer the water to a lined impoundment prior to closure. EPNG feels that closure of this pond is warranted to prevent the persistence of the existing artificially high water table.

2. Pond #1 has already been dewatered through enhanced evaporation techniques.

3. Significant levels of benzene have been detected in piezometer P-10. In addition total Kjeldahl nitrogen has been detected in monitor well M-4. EPNG plans to submit proposals for the investigation and remediation of these locations. The plans will be submitted to NMOCD for approval by the end of the earthwork phase of the project.

In addition to the items listed above, EPNG proposes the attached addendum to the closure plan. The proposals are with regard to the cover system, the salt impacted area, and remediation of the soil excavated from the flare pits.

EPNG requests approval of the amended closure plan and is prepared to commence closure as soon as approval is received. I look forward to your response.

Sincerely yours,

Thomas D. Hutchins

Thomas D. Hutchins
Manager, North Region
Compliance Engineering

ADDENDUM TO THE SAN JUAN RIVER PLANT POND & PIT CLOSURE PLAN

Section 4.3 Drainage Basin Remediation and Closure

EPNG proposes to apply the cover system to the salt impacted area (see Figure 6) without removing the top 6" layer as previously planned. Electrical conductivity measurements taken within the salt impacted area do not significantly decrease at depths of 3-4 feet. The removal of the top 6 inches is, therefore, not warranted in the effort to prevent upward migration of salts. The key to success in this effort is in the removal of the artificial water table that has resulted from the ponds in the area. Once they have been closed and contoured to prevent ponding, EPNG feels that the water table will drop to a depth sufficient to prevent capillary rise. Upon completion of closure activities, EPNG will pump water from the water table, if needed, to ensure the groundwater table is sufficiently lowered.

Section 5.0 Cover System Design

Figure 5 of the closure plan identifies three areas of borrow soil. EPNG has recently performed a visual evaluation of the soil types. It has been determined that there is no major difference in texture between borrow soil #1 and borrow soil #2. EPNG therefore proposes to combine the areas of borrow soil #1 and #2, and to consider it entirely as borrow soil #1. The first 9" layer of the cover system is to be borrow soil #1. The top 9" layer is to be borrow soil #3 (see figure 9).

The sources of borrow soil are of adequate area and topography such that EPNG does not anticipate problems with supply or erosion control. The borrow areas will be contoured and reseeded to provide erosion control.

Section 4.5 Flare Pit Closure

Visually contaminated soil is to be removed from the north and south flare pits. Soil will be excavated to a depth of 10 feet. An assessment will be made at that time to determine the need for further action. EPNG proposes to construct small land treatment cells in the areas of the borrow soils #1 and #3. Soil excavated from the north flare pit would be taken to the area from which the borrow soil #1 has been removed. Similarly, soil removed from the south flare pit would be landfarmed in the area of borrow soil #3. The land treatment cells would be operated in accordance with NMOCD guidelines.

Borrow areas
below to be
used as land
treatment areas,

permit needed
or modification
to existing D.P.

More detailed
proposal needed.
Implementation
schedule

OCD - EPNG Meeting 10/24/91 1000 hrs

participants

Bill Olson } OCD
Roger Anderson
Anu Pandari
Tom Hutchins,
Sandra

Blanco Plant Hydrocarbon Recovery

TH Address OCD Sept 16, 1991 letter on
recovery system

Expect installation by January 1992

B 1.) provided soil gas survey requested

4.) steam out collector, cleaned out
no product after pumped out
will sample after cleaned

smokeless flare will be installed by early 1992
South flare will be closed at that time

RA closure plan for Flares

A.P. Handed out scope of work for north flares pit

Want to take contam. soil to Angel Peak station

WO OCD will review + comment by next week

<u>Kutz Plant</u>

R.A. Can have no oil on lined pond
Need to separate engine room sump fluids
prior to discharge to pond

<u>San Juan River Plant</u>

Check on leaking pond at Western Gas Co. plant

See Sept 30, 1991 letter for responses discussed

<u>need to review</u>

1.) need to excavate soils in salt areas

2.) can disposal of soils from flare pit
be done onsite

Bill - FYI
D.

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

September 30, 1991

notes at
OCD/EPNG
10/24/91 meeting

CERTIFIED MAIL
RETURN RECEIPT NO. P-327-278-258

Mr. Thomas D. Hutchins, Manager
North Region Compliance Engineering
El Paso Natural Gas Company
P.O. Box 1492
El Paso, TX 79978

RE: EPNG SAN JUAN RIVER PLANT:
POND AND PIT CLOSURE PLAN
SAN JUAN COUNTY, NEW MEXICO

Dear Mr. Hutchins:

On June 25, 1991, David Boyer and William Olson of the New Mexico Oil Conservation Division (OCD) met with you to discuss the April 1991 "FINAL CLOSURE PLAN FOR WASTEWATER IMPOUNDMENTS AND FLARE PITS AT EL PASO NATURAL GAS COMPANY'S SAN JUAN RIVER PLANT". The discussion focused on the need to update ground water and soil/sludge information from selected piezometers and monitor wells so that at the completion of work ground water will be protected and EPNG will have minimum future liability for past activities. During the meeting OCD stated that before approval could be given for the proposed work, the additional updated information needed to be provided for our evaluation. The requested analytical analyses and answers to a number of questions asked during the June meeting were provided in your letter of August 30, 1991.

The OCD has reviewed the information provided in your August 30 letter, and meeting notes taken by Mr. Olson and Mr. Henry Van of your office, and finds that additional information and/or commitments from EPNG are necessary before the Plan can receive OCD approval:

✓1. The pump-back system is to be kept in operation as an "active" unit during the closure process (p.24). What decision has been reached regarding disposal of this water? Will the pump-back system be kept operational or in working order for the duration of the proposed five-year cover system monitoring as a back-up measure (p.28)?

pump to
tank then
truck off

propose
to
close &
breach dam
after soil work
completed

✓2. Will pond 1 be dewatered prior to the start of closure? If so, how?

Before closure will be dewatered

3. OCD has concerns regarding the effectiveness of the two-layer cover system proposed for the salt impacted area. Additional information must be provided to demonstrate that the system can work as designed. Specifically, the following questions must be adequately answered:

   a. Are borrow soils #1 and #3 sufficiently coarse to prevent wicking from the substrate to these soils?

   b. Are the textural differences between borrow soil #2 (proposed for the top layer) and soils #1 and #3 (lower layer) sufficient to discourage downward movement of the limited rainfall moisture expected at this locality?

addressed already in Aug 30th letter

   c. What effect will compaction by earthmoving equipment have on the ability of the cover system to perform as designed? ✓

4. Show specifically on the site map the proposed locations for the borrow soils. Is enough soil available in the selected areas to complete the cover system? How will the borrow soil areas be closed and returned to grade so that additional erosion problems are not created? ✓

borrow areas will be recontoured

5. A high level of benzene (7,400 ppb) and elevated values of other volatile aromatic hydrocarbons were detected in well P-10. Prepare an additional work element to provide adequate investigation and remediation of petroleum hydrocarbons at this location. ✓

6. A high level of total Kjeldahl nitrogen (120 ppm) was detected in well M-4. Over time and distance this species can change to nitrate-nitrogen and threaten domestic water supplies. Prepare an additional work element to provide adequate investigation, delineation and remediation (if necessary) of the various nitrogen species in the vicinity of this location. ✓

will be submitted upon completion of soils work

7. Sufficiently high levels of benzene and other aromatics were found at the North Flare Pit to require additional vertical and horizonal sampling by EPNG. Provide additional specifics on the proposed investigation and remediation procedures necessary to properly close both this pit and the South Flare Pit.

will excavate to 10' max from bottom of pit or until soil stds. reached

Disposal of soil at Plant? ✱
DTW @ 30'

If you have any questions regarding the material or information requested in this letter, please call Bill Olson at (505) 827-5885 after October 21. Before providing a specific response to the items addressed in this letter, an additional meeting to discuss this matter could be scheduled if desired by EPNG to speed up resolution of these issues so that physical closure can begin.

Sincerely,

Roger Anderson

Roger Anderson, Acting Chief
Environmental Bureau

cc: OCD Aztec Office

● **SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.
Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address. *(Extra charge)*
2. ☐ Restricted Delivery *(Extra charge)*

3. Article Addressed to:
Mr Thomas D. Hutchins
El Paso Natural Gas Co
P.O. Box 1492
El Paso Tx 79978

4. Article Number
P-327-278-258

Type of Service:
☐ Registered
☒ Certified
☐ Express Mail
☐ Insured
☐ COD
☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature — Address
X

6. Signature — Agent
X

7. Date of Delivery

8. Addressee's Address *(ONLY if requested and fee paid)*

EL PASO
OCT 1991
USPO
TOWN STA.

PS Form **3811**, Mar. 1988 ★ U.S.G.P.O. 1988-212-865 **DOMESTIC RETURN RECEIPT**

AnalyticalTechnologies, Inc. 9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 106920

October 3, 1991

OCT. 1991

handout at
10/24/91
EPNG - OCD meeting

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499

Project Name/Number: Blanco Plant North Flare Pit

Attention: John Lambdin

On 06/27/91, Analytical Technologies, Inc. received a request to analyze soil sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

TCLP-BTEX analyses were performed by ATI, Fort Collins.

For EPA Method 8015, modified, client sample N11248 does not exhibit a typical gasoline pattern. Sample appears to contain a mixture of gasoline and a heavier hydrocarbon.

The results reported for TCLP analyses are the actual measured values, and are not corrected for matrix spike recovery bias. The matrix spike recovery results for TCLP analyses are included in this report.

Enclosed is an amended report for TCLP method 8020 (BTEX). The units have been changed from ug/kg to ug/L. We apologize for any inconvenience this may have caused.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary G Tyer
Mary Tyer
Project Manager

Robert V. Woods
Robert V. Woods
Laboratory Manager

RVW:jat
Enclosure

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

Analytical **Technologies**, Inc.

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT

DATE RECEIVED : 06/27/9
REPORT DATE : 07/22/9

ATI I.D. : 106920

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTE
01	N11248	SOIL	06/26/9
02	N11249	SOIL	06/26/9

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from th date of this report. If an extended storage period is required, please contac our sample control department before the scheduled disposal date.

Analytical Technolog[illegible], Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 106920

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT

DATE RECEIVED : 06/27/9
REPORT DATE : 07/22/9

PARAMETER	UNITS	01	02
PETROLEUM HYDROCARBONS, IR	MG/KG	63000	32000

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT
ATI I.D. : 106920

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% RE
PETROLEUM HYDROCARBONS	MG/KG	10690603	<20	23	NA	220	190	11

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 10

METALS RESULTS

ATI I.D. : 106920

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT

DATE RECEIVED : 06/27/
REPORT DATE : 07/22/

PARAMETER	UNITS	01	02
SILVER (IN TCLP)	MG/L	<0.010	<0.010
ARSENIC (IN TCLP)	MG/L	<0.1	<0.1
BARIUM (IN TCLP)	MG/L	2.35	1.43
CADMIUM (IN TCLP)	MG/L	0.006	<0.005
CHROMIUM (IN TCLP)	MG/L	<0.05	<0.05
MERCURY (IN TCLP)	MG/L	<0.0002	<0.0002
LEAD (IN TCLP)	MG/L	<0.10	<0.10
SELENIUM (IN TCLP)	MG/L	<0.1	<0.1

Analytical Technolo s, Inc.

METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT
ATI I.D. : 106920

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% RE
SILVER (IN TCLP)	MG/L	10756003	<0.010	<0.010	NA	0.946	1.00	95
ARSENIC (IN TCLP)	MG/L	10756003	<0.1	<0.1	NA	1.1	1.0	11
BARIUM (IN TCLP)	MG/L	10755003	0.722	0.725	0.4	1.84	1.00	11
CADMIUM (IN TCLP)	MG/L	10756003	<0.005	<0.005	NA	1.02	1.00	10
CHROMIUM (IN TCLP)	MG/L	10692002	<0.05	<0.05	NA	0.49	0.50	98
MERCURY (IN TCLP)	MG/L	10756003	<0.0002	<0.0002	NA	0.0046	0.0050	92
LEAD (IN TCLP)	MG/L	10755003	<0.10	<0.10	NA	0.94	1.00	94
SELENIUM (IN TCLP)	MG/L	10756003	<0.1	<0.1	NA	10.7	10.0	10

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 10$$

AnalyticalTechnolog[illegible], Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10692001

TEST : FUEL HYDROCARBONS (MODIFIED EPA METHOD 8015)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT
CLIENT I.D. : N11248
SAMPLE MATRIX : SOIL

DATE SAMPLED : 06/26/9
DATE RECEIVED : 06/27/9
DATE EXTRACTED : 06/28/9
DATE ANALYZED : 06/29/9
UNITS : MG/KG
DILUTION FACTOR : 10

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	2600
HYDROCARBON RANGE	C5-C32
HYDROCARBONS QUANTITATED USING	GASOLINE

SURROGATE PERCENT RECOVERIES

DI-N-OCTYL-PHTHALATE (%)	99

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10692002

TEST : FUEL HYDROCARBONS (MODIFIED EPA METHOD 8015)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT
CLIENT I.D. : N11249
SAMPLE MATRIX : SOIL

DATE SAMPLED : 06/26/9
DATE RECEIVED : 06/27/9
DATE EXTRACTED : 06/28/9
DATE ANALYZED : 06/30/9
UNITS : MG/KG
DILUTION FACTOR : 100

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	15000
HYDROCARBON RANGE	C5-C14
HYDROCARBONS QUANTITATED USING	GASOLINE
SURROGATE PERCENT RECOVERIES	
DI-N-OCTYL-PHTHALATE (%)	**

** Due to the necessary dilution of the sample, result was not attainable

Analytical**Technologies**, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : FUEL HYDROCARBONS (MODIFIED EPA METHOD 8015)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 106920
DATE EXTRACTED : 06/28/9
DATE ANALYZED : 06/28/9
UNITS : MG/KG
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	-

SURROGATE PERCENT RECOVERIES

DI-N-OCTYL-PHTHALATE (%)	98

QUALITY CONTROL DATA

ATI I.D. : 106920

TEST : FUEL HYDROCARBONS (MODIFIED EPA METHOD 8015)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT
REF I.D. : 10799815

DATE ANALYZED : 06/28/91
SAMPLE MATRIX : NON-AQUEO
UNITS : MG/KG

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RP
FUEL HYDROCARBONS	<5	50	40	80	40	80	0

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100

Analytical Technolo[illegible]s, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10692001

TEST : BTEX (8020) AND MTBE IN TCLP EXTRACT

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT
CLIENT I.D. : N11248
SAMPLE MATRIX : SOIL

DATE SAMPLED : 06/26/9
DATE RECEIVED : 06/27/9
DATE EXTRACTED : 07/01/9
DATE ANALYZED : 07/03/9
UNITS : UG/L
DILUTION FACTOR : 100

COMPOUNDS	RESULTS
BENZENE	2000
TOLUENE	8100 E
ETHYLBENZENE	230
TOTAL XYLENES	270
METHYL-t-BUTYL ETHER	NA

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	120

E-EXCEEDS INSTRUMENT CALIBRATION RANGE

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10692002

TEST : BTEX (8020) AND MTBE IN TCLP EXTRACT

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT
CLIENT I.D. : N11249
SAMPLE MATRIX : SOIL

DATE SAMPLED : 06/26/9
DATE RECEIVED : 06/27/9
DATE EXTRACTED : 07/01/9
DATE ANALYZED : 07/03/9
UNITS : UG/L
DILUTION FACTOR : 100

COMPOUNDS	RESULTS
BENZENE	2300
TOLUENE	7900 E
ETHYLBENZENE	240
TOTAL XYLENES	940
METHYL-t-BUTYL ETHER	NA

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	130

E-EXCEEDS INSTRUMENT CALIBRATION RANGE

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : BTEX (8020) AND MTBE IN TCLP EXTRACT

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 106920
DATE EXTRACTED : 07/01/9
DATE ANALYZED : 07/03/9
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
ETHYLBENZENE	<0.5
TOTAL XYLENES	<0.5
METHYL-t-BUTYL ETHER	NA

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	95

QUALITY CONTROL DATA

ATI I.D. : 106920

TEST : BTEX (8020) AND MTBE IN TCLP EXTRACT

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : BLANCO PLNT
REF I.D. : 10799910

DATE ANALYZED : 07/03/91
SAMPLE MATRIX : NON-AQUEOI
UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPI
BENZENE	7.6	5	13	108	NA	NA	NA
TOLUENE	<0.5	5	4.4	88	NA	NA	NA
ETHYLBENZENE	<0.5	5	5.8	116	NA	NA	NA
TOTAL XYLENES	<0.5	5	5.8	116	NA	NA	NA
METHYL-T-BUTYL ETHER	NA	NA	NA	NA	NA	NA	NA

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

El Paso
Natural Gas Company

CHAIN OF CUSTODY RECORD (505) 599-2152

6/27/91

Project No.	Project Name BLANCO PLANT NORTH FLARE PIT		Contract Laboratory ANALYTICAL TECHNOLOGIES, INC 9830 SOUTH 51ST STREET STE B PHOENIX, AZ 85044
Samplers: (Signature) Norman K. Norvelle	Date 6-26-91	Receiving Temp. (°F)	

Lab ID	Date	Time	Matrix	Sample Number	Total No. of Containers	Chain of Custody Seals	Intact?	Composite or Grab	MODIFIED 8015 See Attached	TCLP TPH	8-METALS TCLP	BTEX	418.1 TPH	Remarks
1	6/26/91	9:00	SOIL	N11248	4	NO	-	C	X	X	X	X		5 point composite - 6" DEPTH
2	6/26/91	11:00	SOIL	N11249	4	NO	-	C	X	X	X	X		5 point From Depth of MAX PENETRATION ↑ SUBSOIL ↑

Relinquished by: (Signature) Norman K. Norvelle NORMAN NORVELLE	Date/Time 6/26/91 13:00	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time 6/27 11:00	Received by: (Signature) Lin A Eshelman
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks: ATI ACC. # 106920	
Results & Invoices to:: JOHN LAMBDIN, EPNG, P.O. BOX 4990, FARMINGTON, NM 87499		Charge Code work order # 108-X50949-001-2010		Date Results Reported / by: (Signature)	

WHITE-Testing Laboratory YELLOW-EPNG

El Paso
Natural Gas Company

P. O. BOX 1492
EL PASO, TEXAS 79978
PHONE: 915-541-2600

October 23, 1991

handouts at
10/24/91
EPNG - OCD meeting

Mr. Roger Anderson
Acting Environmental Bureau Chief
New Mexico Oil Conservation Division
P.O. Box 2088
Land Office Building
Santa Fe, New Mexico 87504-2088

RE: Hydrocarbon Recovery Proposal for El Paso Natural Gas Company's Blanco Compressor Station

Dear Mr. Anderson:

It is my pleasure to provide the attached HYDROCARBON RECOVERY, WORK PLAN, dated October 1991, covering the installation of two recovery wells at EPNG's Blanco Compressor Station. The plan has been revised as requested in Mr. David Boyer's letter dated September 16, 1991. The October 1991 plan addresses the issues of increased screen length and providing for active pumping of the recovery wells, as requested in the September 16 letter.

Also attached is a summary of the John Mathes and Associates soil gas survey and water samples collected at Blanco earlier this year. Furthermore, copies of the analytical results for samples collected earlier this year by EPNG lab personnel in thirteen monitor wells are attached as requested in the September 16 letter. This is provided as additional information on soil and groundwater investigations performed at Blanco.

The attached data should be satisfactory to comply with the conditions set forth in Mr. Boyer's letter. We anticipate the installation of the recovery wells will commence before the end of the year.

If you have any questions or need additional information please advise.

Very truly yours,

Thomas D. Hutchins

Thomas D. Hutchins, Manager
North Region Compliance Engineering

bc: G. E. Bauer
N. Prince
A. N. Pundari
H. Van
File 5200

10/24/91
EPNG/OCD meeting

SCOPE OF WORK

CLOSURE OF NORTH FLARE PIT NEAR BLANCO PLANT

I. GENERAL

The project involves closure of an inactive flare pit located north of El Paso Natural Gas Company's Blanco Plant. The flare pit is located in Section 11,Township 29N,Range 11W, San Juan County, approximately 1/4 mile north of Blanco Plant. Blanco Plant is located approximately one mile north of Bloomfield, New Mexico. The location of the plant is shown on the attached map.

The primary objective is to remove all hydrocarbon contaminated soil.

II. EXCAVATION AND HAULING REQUIREMENTS

The existing pit is approximately 150 foot feet long, 75 feet wide and 20 feet deep . The contractor must excavate a minimum 20 feet of soil from the bottom of the pit. In addition, hydrocarbon contaminated soil from the pit berms should also be excavated and removed. Since the existing pit is approximately 20 feet from grade, the contractor will need to slope the existing pit sides in order to allow equipment access to the bottom of the pit.

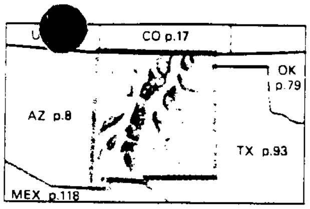
The contractor must transport the contaminated soil to El Paso Natural Gas Company's(EPNG) Angel Peak Plant. Angel Peak Plant is located at NE/4, Section 8, T-27-N,R-10-W,San Juan County. The plant is approximately sixteen miles from Blanco Plant. To get to the plant, go south on Highway 44. Then turn left on a dirt road, across from the intersection of NAPI Road 3003 and Highway 44. A six mile dirt road leads to the plant. The road does not have a county road designation and is known only as the "Angel Peak Plant Road".

At Angel Peak Plant,the contractor must install a two foot high earthen berm and forty seven inch high "hogwire" fence around the proposed soil remediation area. The location of the soil remediation area will be selected by an EPNG representative.In addition, a twenty foot wide drive through gate must be installed on one side of the remediation area.

The contractor must spread the soil at the disposal site in a six inch lift. Assuming 8333 cubic yards (150ft*75ft*20ft) of soil will be excavated, a 300 feet by 750 feet area must be bermed and fenced. In addition, the contractor must disc the soil two times per week for the duration of the remediation project. Assuming a backhoe can excavate 550 cubic yards per day, the project length will be approximately sixteen days.

New Mexico

Land Area: 121,336 sq. mi. (5)
Population: 1,494,200 (37)
Dimensions: N-S 390 miles, E-W 350 miles
Highest Point: Wheeler Peak 13,161 ft., C-7
Capital: Santa Fe, E-6
Largest City: Albuquerque, F-5
Index page 123



Selected Recreational [illegible]torical Sites

Aztec Ruins National Monument, B-3
Capulin Volcano National Monument, B-10
Carlbad Caverns National park, M-9
El Morro National Monument, J-2
Gila Cliff Dwellings National Monument, J-2
Pecos National Monument, E-7
Taos, C-7
White Sands National Monument, K-6

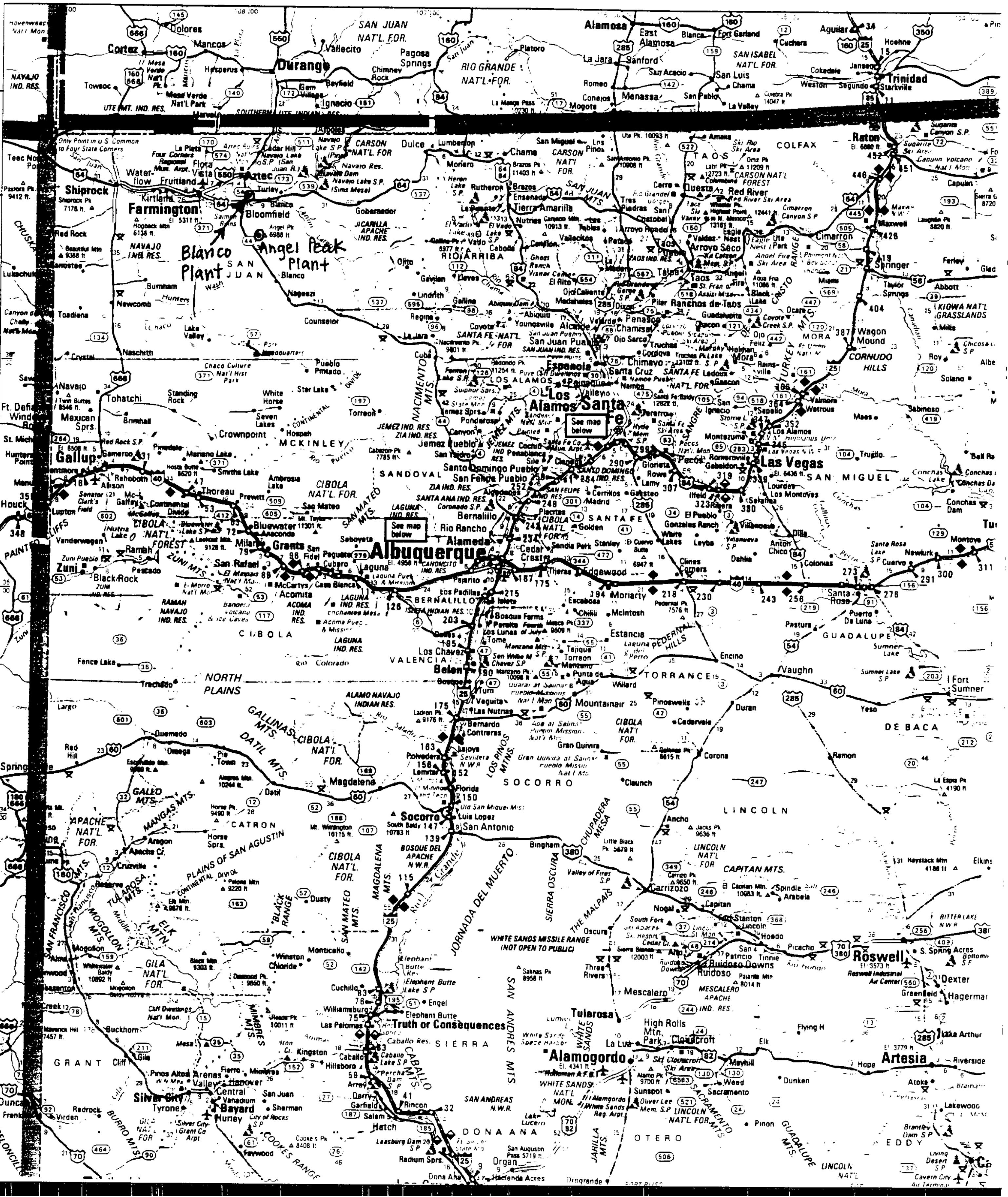
How to Determine Distance

0 10 20 30 Miles
0 10 20 30 40 Kilometers

Mileage in red between red arrowheads, in black between intersections. Some interchange numbers indicate mileage.

Mileage Between

	Alamogordo	Albuquerq
Albuquerque	209	
Clovis	229	
Las Cruces	69	
Roswell	118	
Santa Fe	228	



The contractor must assist EPNG by providing the use of the backhoe for collection of soil samples (after excavation of 20 feet of pit bottom). Additional excavation beyond the 20 feet depth will be based on field Total Petroleum Hydrocarbon(TPH) soil tests.

At EPNG's request,the contractor shall dig bellholes at various locations(after excavation of 20 feet of pit bottom) at the site. EPNG will analyze the soil samples from the bellholes. Based on the TPH results from the bellholes and NMOCD guidance ,EPNG will decide whether to dig further or backfill the pit.

EPNG estimates a minimum of two weeks will be needed to provide a decision on whether further excavation is required. EPNG will give the contractor a three day notice before requiring the contractor to either excavate further or backfill the excavation.

If further excavation is required, the costs will be based on Items #1 and #2 of the Cost Schedule shown in Section IV.

II. CLOSURE REQUIREMENTS

Once the project inspector or project engineer determines that further excavation is impractical or the field TPH test results are acceptable , the pit may be backfilled.

EPNG will provide a borrow site near Angel Peak Plant for clean backfill. The backfill soil is located approximately 600 feet from the soil remediation area. The backfill must be stored onsite, southwest of the flare pit, until EPNG gives approval to backfill the pit.

As a final step in the closure of the flare pit, the contractor shall contour the backfill to avoid ponding, control runoff and erosion.

III. OTHER REQUIREMENTS

The contractor is required to follow New Mexico Motor Transportation Division and Department of Transportation rules regarding truck weight limitations and other applicable transportation rules.

All work performed by the contractor shall conform to applicable industry codes and standards and the EPNG Manual of Engineering Standards. All excavation activities must be in accordance with applicable OSHA and EPNG standards. The EPNG inspector or project engineer will have authorization to make changes in the material or specified procedures. No changes shall be made without the written approval of the project inspector or engineer.

The contractor shall be responsible for providing the required protection and security for equipment or materials on the job site. EPNG will not assume any liability for losses of materials or equipment.

The contractor must provide a list of any subcontractors with the bid. The contractor must receive written approval from EPNG before using subcontractors for any portion of the work. Such approval will not relieve the contractor of any obligations with EPNG.

The contractor shall be responsible for keeping the job site clean and neat and shall provide a general cleanup of the area after completion of the project.

IV. COST SCHEDULE

1. Contaminated Soil Excavation,Hauling,Spreading and Discing at Angel Peak Plant ______________/cubic yard

2. Clean Sandy Backfill from Angel Peak Plant ______________/cubic yard

3. Construction of two foot high berm and forty seven inch high "Hogwire" Fence at Angel Peak Plant ______________/lineal foot

HYDROCARBON RECOVERY
at El Paso Natural Gas Company's
Blanco Plant

WORK PLAN

OCTOBER, 1991

handout at
10/24/91
EPNG - OCD meeting

EXECUTIVE SUMMARY

Hydrocarbon recovery is proposed at two locations at EPNG's Blanco plant. In the north area a new 6-inch diameter well is proposed near the existing monitoring well MW-19 (referred to here as RW-19A). This well will be screened so as to intercept the hydrocarbon layer at the top of the unconfined alluvial aquifer. In the south area the existing 4-inch diameter monitoring well, MW-6 which is screened across the top of the aquifer, is proposed as a recovery well while investigations proceed at this facility.

It is proposed that a dual pump system be installed in well RW-19A. This system will consist of a small diameter hydrocarbon-selective pump and a watertable depression pump. The liquids removed from the aquifer will be pumped separately as hydrocarbons and water, and will be disposed of separately.

It is proposed that a single pump be installed in MW-6 to pump both water and floating hydrocarbons. The hydrocarbon phase will be separated from the water phase on site and both fluids disposed of separately.

Pump sizes and pumping rates for both wells will be determined after completion of aquifer tests and analysis of the physical properties of the fluids to be pumped.

CONTENTS

I. BACKGROUND

II. NORTH AREA

III. SOUTH AREA

IV. SPECIFICATIONS

FIGURES:

Figure 1. Top of Bedrock and Water Levels

Figure 2. Proposed Well Location, North Area

Figure 3. Proposed Well Location, South Area

TABLES:

Table 1. Hydrogeologic Conditions and Contaminants

Table 2. Water Levels at Blanco Plant

HYDROCARBON RECOVERY
at El Paso Natural Gas Company's
Blanco Plant

I. BACKGROUND

Floating hydrocarbons have been identified in two monitoring wells at the Blanco Plant site. The New Mexico Oil Conservation Division has requested that El Paso Natural Gas (EPNG) prepare a work plan for removal of the hydrocarbons. This plan shall consist of recovery well installation, and pumping and disposal of the hydrocarbons. Further studies will be conducted to assess site hydrogeology and the source and extent of hydrocarbons.

The actions recommended are based on hydrogeologic information obtained during the studies by McBride-Ratcliff and Associates, Inc., (1988), Bechtel (1988) and K. W. Brown (1990), on preliminary results of the soil gas and groundwater survey performed by John Mathes and Associates (April 15-17, 1991), and on groundwater quality information obtained by EPNG personnel in June, 1991. The information pertinent to this work plan is summarized in Tables 1 and 2.

II. NORTH AREA

Based on data from soil borings for monitor wells and geotechnical programs, Well 19 is located in a paleochannel (buried canyon) in the bedrock (Figure 1), which is now filled with alluvial sediment. The canyon appears to be relatively steep-walled, and probably is reflected in the location of the present arroyo. The canyon walls appear to act as a control on the local groundwater movement.

This well was installed on January 11, 1990. At that time, PID vapor readings were at 2,000 ppm from inside the PVC casing and a hydrocarbon odor and oily sheen were reported on the water level probe. Water samples collected indicated 29 mg/l of total petroleum hydrocarbons, 4200 ug/l benzene, <50 ug/l toluene, 340 ug/l ethylbenzene, and 3740 ug/l total xylenes. None of these analytes were detected in water samples collected at that time from Well 2, approximately 500 feet downgradient.

Water samples were collected on June 18, 1991. At that time approximately 4 inches of free hydrocarbons were observed in the well. No odor or visible contamination was reported in Well 2 during that sampling event. Toluene was detected at .7 ug/l and total xylenes at .9 ug/l were detected in the samples from Well 2. The analyses did not detect total petroleum hydrocarbons at a detection limit of 1 mg/l.

The soil gas survey performed by John Mathes and Associates (JMA) at the north flare pit (samples designated AFP), which is no longer in use, indicates that this pit is possibly the source of the hydrocarbons found in Well 19 (Figure 2). Four borings were located at this pit, one upgradient and three downgradient. All four borings indicated the presence of hydrocarbons in soil gas samples collected. The evaporation pond which is presently lined, was previously unlined (samples designated EP), and may also be a source for hydrocarbons in Well 19. JMA collected three soil gas samples at this area. The upgradient sample (EP-1-20-SG) from location B-1 indicated the presence of hydrocarbons.

Groundwater was not encountered in probe holes at these locations and therefore no water samples were collected by JMA at either the flare pit or the pond.

A single recovery well is recommended just downgradient of Well 19. This location would recover hydrocarbons from both possible sources (the abandoned flare pit and the old unlined pond) and be near the leading edge of the plume of floating hydrocarbons. This proposed well is referred to as RW-19A in this work plan.

III. SOUTH AREA

The steep paleochannel identified in the north area appears to become more broad and shallow to the south end of the site (Figure 1), and filled with less alluvial material. The flare pit and Well 6 appear to be near the eastern edge of this channel. Groundwater flow is to the southwest near the flare pit. It appears that although Well 6 is slightly cross-gradient to the flare pit, no other potential sources exist in the area. In addition, the soil gas survey conducted by JMA (see below) indicates that hydrocarbon contamination attenuates rapidly away from this pit in the downgradient direction.

Well 6 was installed on September 21, 1988. Stained soil with hydrocarbon odor was detected between 12 and 23 feet below the surface. Soils analyzed from these intervals did not contain detectable levels of organic compounds. The well was screened between 19 and 29 feet below the surface. Water samples collected at that time were analyzed for benzene, toluene, ethylbenzene and total xylenes, and none of these compounds were detected. No samples were collected from this well in the January 1990 sampling round.

Water samples were collected on June 18, 1991. At this time 2 inches of free hydrocarbons were observed in this well.

Five soil gas samples were collected by JMA around the south flare pit (Figure 3). Sample FP-5-30-SG from the upgradient location (B-5) and samples FP-1-30-SG and FP-2-30-SG from downgradient locations (B-1 and B-2) indicated that hydrocarbons are present in the unsaturated zone. Only a trace of hydrocarbons (1 ug/l) were detected in upgradient location B-6 (sample FP-6-30-SG) and none in downgradient location B-4 (sample FP-4-30-SG). Water was encountered at the downgradient location B-3. No TPH or BTEX were detected in sample FP-3-30-WH collected at that location.

A single recovery well is indicated near the flare pit at this time. Existing Well 6 is located in such a position as to collect hydrocarbons, and is large enough to accommodate a pump. From the sampling history detailed above, it appears that hydrocarbons are migrating at a slow rate in this area. The best alternative therefore would be to pump this well with known contamination, while further studies are underway as to the configuration of the plume.

IV. SPECIFICATIONS

Specifications will be prepared for a contract driller and for in-house support from the conceptual outline which follows.

Well Drilling: The preferred drilling method is hollow stem auger, but air rotary equipment may be considered. Split spoon samples should be collected every 5 feet if hollow stem auger equipment is used. These samples will be for chemical analysis and lithologic logging purposes.

Well Construction: The well RW-19A will be constructed of six inch PVC. The screen will be either mild or stainless steel, placed near the with at least two feet of screen above the water level and at least 10 feet of screen below the water surface to produce sufficient volume of pumping and to accommodate seasonal water level fluctuations. At least a 15 foot, .010 screen will be used as it is anticipated that only the product layer will be pumped. A gravel pack consisting of silica sand, size #30, a bentonite seal, cement - bentonite grout to surface, and galvanized surface casing will also be installed.

Well Development: The well will be developed by surging and pumping with air or water to remove fine material introduced during drilling prior to sampling.

Aquifer Tests: Slug tests (either bail down or plug) will be conducted on both hydrocarbons and groundwater in the new recovery well RW-19A and in Well 6 prior to initiation of pumping.

Sampling and Analysis: Physical tests (grain size analysis, porosity, bulk density) will be performed on soils from screened intervals. Physical tests (viscosity, specific gravity) will be performed on hydrocarbons and on water samples. Chemical analysis will be performed on soil samples from the new well, and on floating hydrocarbons and water from both wells. Analytes will include cations/anions, TDS and nitrogen (NO3, NO2 and TKN). BTEX and TPH analyses will not be performed because floating product is present.

Surveying: Location, surface level, top of casing will be surveyed.

Pumping: Pump sizes and pumping rates for both wells will be determined after completion of aquifer tests and analysis of the physical properties of the fluids to be pumped.

RW-19A: The dual pump system should be of a small diameter in order to fit inside the 6 inch diameter well. One pump should be equipped with a sensor which allows collection of floating hydrocarbons only. The other pump shall be placed lower in the well in such a way as to create sufficient drawdown to recover the floating product.

MW-6: The pump should be of a small diameter in order to fit inside the 4 inch diamter well. The pump will be explosion proof and capable of pumping both hydrocarbons and water.

Disposal:

RW-19A: Assuming that the pumps collect the hydrocarbon phase and water phases separately, the limited volume of hydrocarbon liquid could possibly be disposed of through a used oil vendor. The water phase will be disposed of appropriately.

MW-6: Since both water and hydrocarbons are removed together, the liquids will be separated at the surface and disposed of appropriately.

TABLE 1

Hydrogeologic Conditions And Presence Of Contaminants At Existing Monitor Wells

	MW-19	MW-6
Lithology of screened interval	gravel, sandstone	clay, fine to med. sand
Aquifer thickness	64'	35' (estimated)
Saturated thickness	10'	12' (estimated)
Seasonal fluctuations	June 91 1' > Jan 90	June 91 2' > Jan 90
Boundaries	Arroyo/paleo channel wall < 50' to SE	outcrop 600' to west
Amount of product	4" layer (6/18)	2" layer (6/19)
Sources	north flare pit/unlined evap. pond	south flare pit
Well diameter	2"	4"
Hydraulic conductivity	1×10^{-1} (estimate no bail test)	1.5×10^{-4} cm/sec from bail test
Gradient	.007	.006
Transmissivity	212 gpd/ft. (b = 10')	102 gpd (b = 32') 38 gpd/ft (b = 12')

Table 2. Blanco Plant Monitor Well Data

WELL NO.	GROUND ELEV.	TOP OF CASING	DEPTH TO BR	BED ROCK ELEV	DEPTH TO TD	TOTAL DEPTH ELEV.	SCREEN INTER-VAL	BASE SCREEN	DATE	DEPTH TO WATER	STATIC WATER LEVEL	DATE	DEPTH TO WATER	STATIC WATER LEVEL
1	5649	na	51	5598	52	5597	na							
2	5614	5615.97	57.5	5556.5	57.5	5556.5	10	5557.7	1/8/90	51.87	5564.1	6/18/91	53.75	5562.22
3	5590	na	6	5584	8	5582	na							
4	5582	na	7	5575	8	5574	na							
5	5565	5566.5	?	5565	20	5545	10	5546.5	1/8/90	14.05	5552.45	6/18/91	14.67	5551.83
6	5576	5577	?	5576	31	5545	10	5547	1/8/90	21.22	5555.78	6/18/91	23.25	5553.75
7	5568	5569	20.5	5547.5	21	5547	10	5549	1/8/90	17.65	5551.35	6/18/91	18	5551
8	5578	5580.3	32	5546	35	5543	10	5544.7	1/8/90	26.47	5553.83	6/18/91	28.83	5551.47
9	5567	na	10	5557	12.5	5554.5	na							0
10	5563	5564.2	14	5549	15	5548	5	5549.2	1/8/90	12.59	5551.61	6/18/91	13.5	5550.7
11	5598.1	na	5	5593.1	70	5528.1	na							0
12	5599.05	5601.44	5	5594.05	25	5574.05	5	5574.3	1/15/90	21.4	5580.04	6/18/91	18.58	5582.86
13	5597.38	5597.44	3	5594.38	23.8	5573.58	5	5573.83	1/15/90	17.7	5579.74	6/18/91	15.17	5582.27
14	5598.14	5598.07	4	5594.14	27.4	5570.74	5	5570.99	1/15/90	21.5	5576.57	6/18/91	22.58	5575.49
15	5596.5	5596.32	4	5592.5	26.9	5569.6	5	5569.85	1/15/90	20	5576.32	6/18/91	21	5575.32
16	5597.58	5597.43	4	5593.58	29	5568.58	5	5568.83	1/15/90	27.3	5570.13	6/18/91	19.33	5578.1
17	5599.16	5601.51	5	5594.16	12	5587.16	3	5587.41	1/15/90	dry	na	6/18/91	dry	na
18	5598.15	5598.21	4	5594.15	11	5587.15	3	5587.4	1/15/90	dry	na	6/18/91	10	5588.21
19	5619.7	5622.02	64	5555.7	66	5553.7	10	5554.5	1/15/90	55.7	5566.32	6/18/91	56.67	5565.35

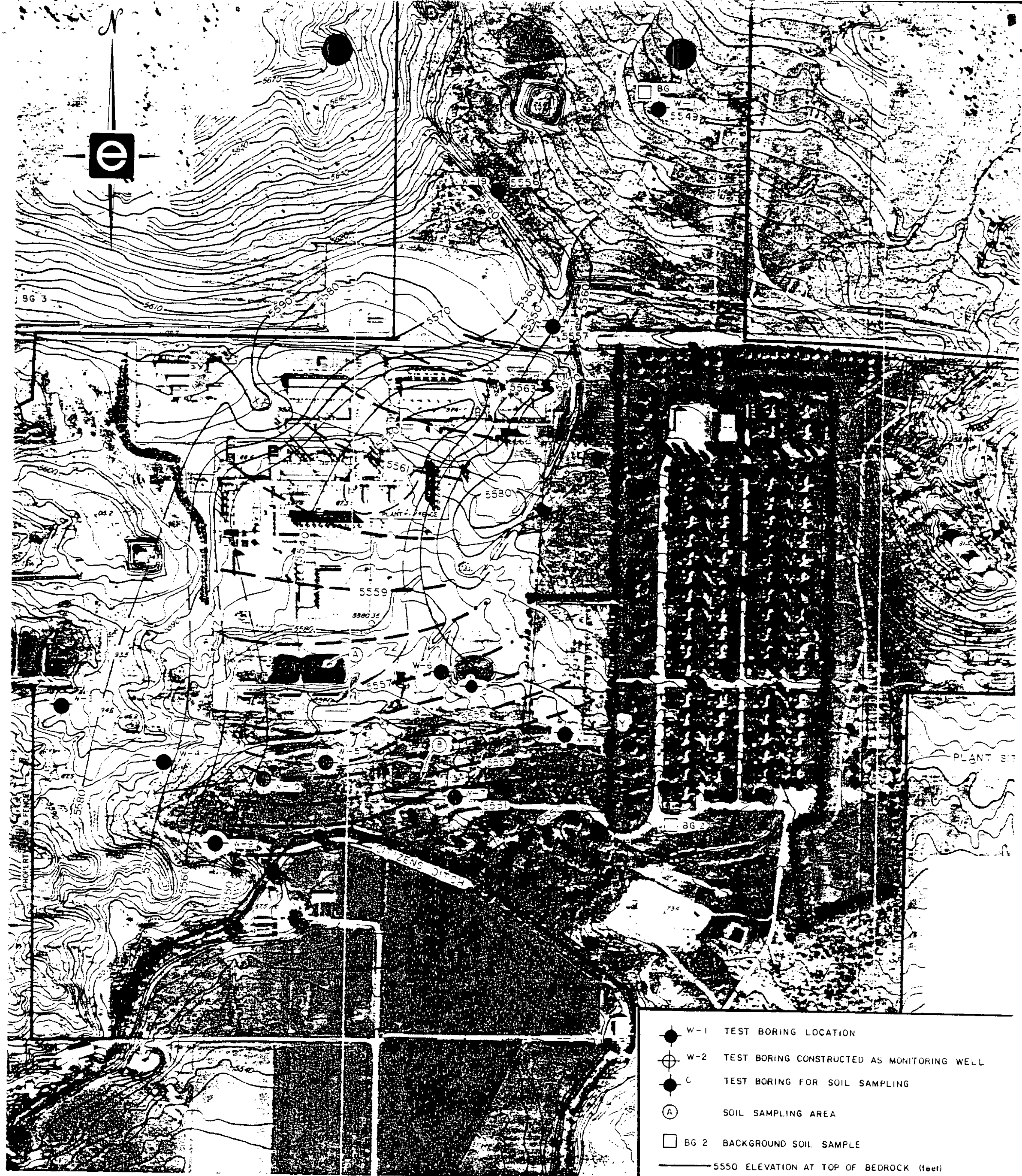


FIGURE 1 & 2	■	SOIL GAS SAMPLE WHERE VOLATILE ORGANIC COMPOUNDS WERE DETECTED.
	▲	"CLEAN SOIL" GAS SAMPLE
FIGURE 2	⊗	PROPOSED EXTRACTION WELL LOCATION

ENGINEERING RECORD	
DRAWN BY	Aero-Graphics
TRACED BY	
CHECKED BY	
APPROVED	
DATE	
PHOTO DATE	10-18-82
CONTOUR INTERVAL	2

El Paso Natural Gas Company

SITE INVESTIGATION LOCATION PLOT
BLANCO PLANT

SEC 14, TWS 29-N, RANGE 11-W
SAN JUAN COUNTY, NEW MEXICO DATE: NOV. 198

400

FIGURE 1

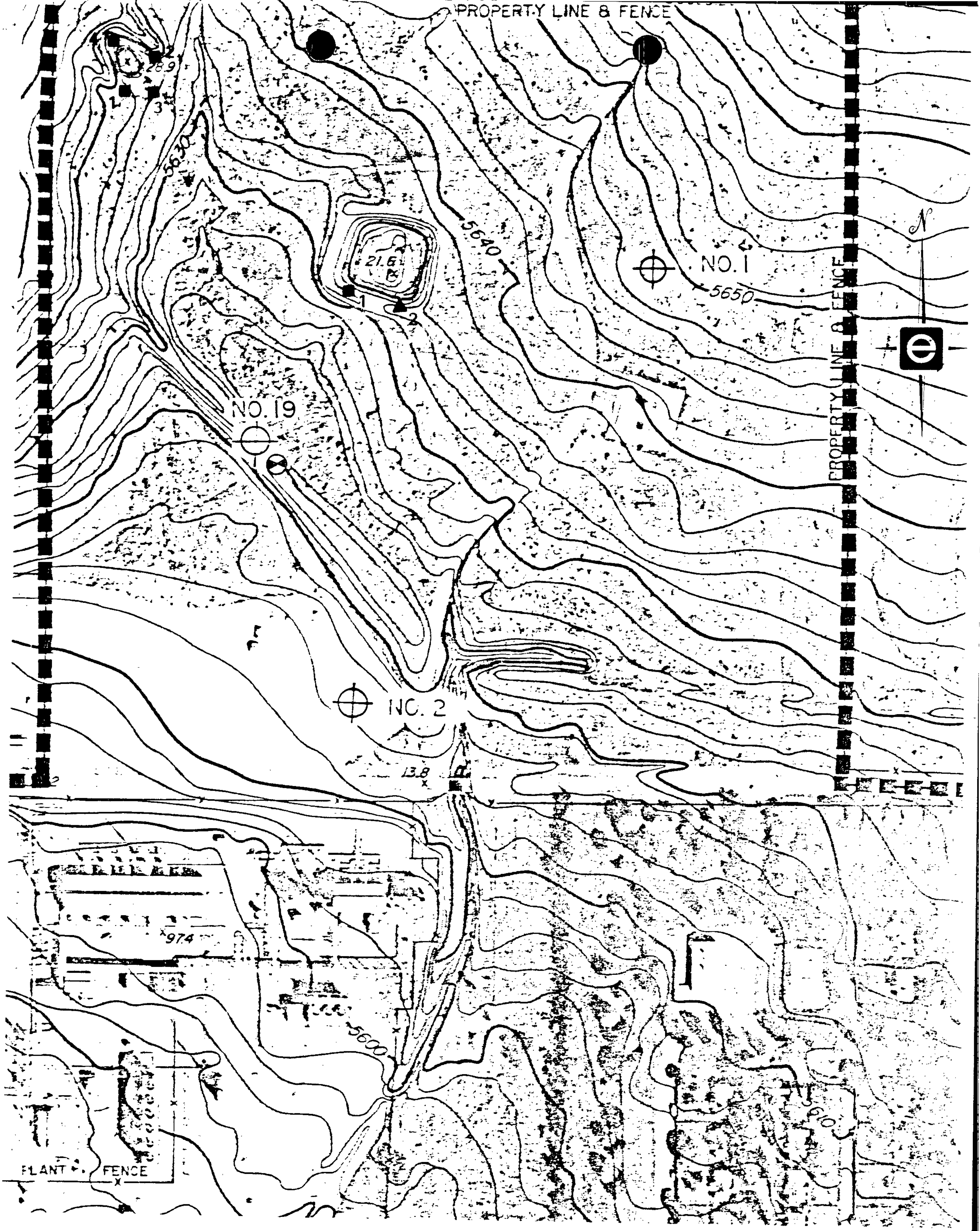

PROPERTY LINE & FENCE
28.9
1
2
3
5630
21.6
1
2
5640
NO. 1
5650
PROPERTY LINE & FENCE
N
NO. 19
1
NO. 2
13.8
97.4
5600
610
PLANT FENCE

FIGURE 2

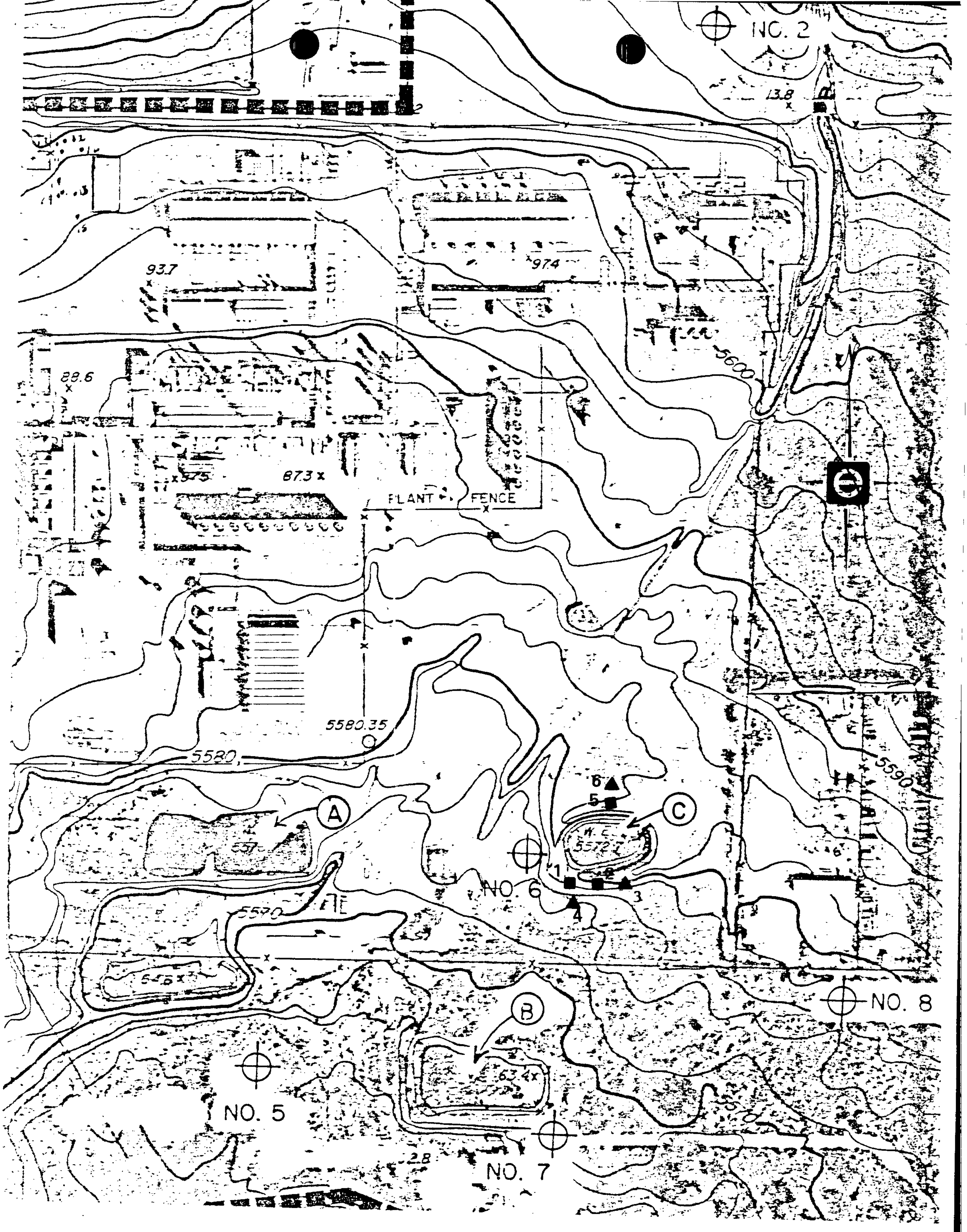

NO. 2
13.8
97.4
93.7
5600
88.6
975
87.3
PLANT FENCE
5580.35
5580
5590
A
C
6
5
W.E.
5572
1
2
3
4
NO. 6
557
5570
64.6
B
63.4
NO. 5
NO. 7
NO. 8
2.8

FIGURE 3

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

September 30, 1991

CERTIFIED MAIL
RETURN RECEIPT NO. P-327-278-258

Mr. Thomas D. Hutchins, Manager
North Region Compliance Engineering
El Paso Natural Gas Company
P.O. Box 1492
El Paso, TX 79978

RE: EPNG SAN JUAN RIVER PLANT:
POND AND PIT CLOSURE PLAN
SAN JUAN COUNTY, NEW MEXICO

Dear Mr. Hutchins:

On June 25, 1991, David Boyer and William Olson of the New Mexico Oil Conservation Division (OCD) met with you to discuss the April 1991 "FINAL CLOSURE PLAN FOR WASTEWATER IMPOUNDMENTS AND FLARE PITS AT EL PASO NATURAL GAS COMPANY'S SAN JUAN RIVER PLANT". The discussion focused on the need to update ground water and soil/sludge information from selected piezometers and monitor wells so that at the completion of work ground water will be protected and EPNG will have minimum future liability for past activities. During the meeting OCD stated that before approval could be given for the proposed work, the additional updated information needed to be provided for our evaluation. The requested analytical analyses and answers to a number of questions asked during the June meeting were provided in your letter of August 30, 1991.

The OCD has reviewed the information provided in your August 30 letter, and meeting notes taken by Mr. Olson and Mr. Henry Van of your office, and finds that additional information and/or commitments from EPNG are necessary before the Plan can receive OCD approval:

1. The pump-back system is to be kept in operation as an "active" unit during the closure process (p.24). What decision has been reached regarding disposal of this water? Will the pump-back system be kept operational or in working order for the duration of the proposed five-year cover system monitoring as a back-up measure (p.28)?

2. Will pond 1 be dewatered prior to the start of closure? If so, how?

3. OCD has concerns regarding the effectiveness of the two-layer cover system proposed for the salt impacted area. Additional information must be provided to demonstrate that the system can work as designed. Specifically, the following questions must be adequately answered:

    a. Are borrow soils #1 and #3 sufficiently coarse to prevent wicking from the substrate to these soils?

    b. Are the textural differences between borrow soil #2 (proposed for the top layer) and soils #1 and #3 (lower layer) sufficient to discourage downward movement of the limited rainfall moisture expected at this locality?

    c. What effect will compaction by earthmoving equipment have on the ability of the cover system to perform as designed?

4. Show specifically on the site map the proposed locations for the borrow soils. Is enough soil available in the selected areas to complete the cover system? How will the borrow soil areas be closed and returned to grade so that additional erosion problems are not created?

5. A high level of benzene (7,400 ppb) and elevated values of other volatile aromatic hydrocarbons were detected in well P-10. Prepare an additional work element to provide adequate investigation and remediation of petroleum hydrocarbons at this location.

6. A high level of total Kjeldahl nitrogen (120 ppm) was detected in well M-4. Over time and distance this species can change to nitrate-nitrogen and threaten domestic water supplies. Prepare an additional work element to provide adequate investigation, delineation and remediation (if necessary) of the various nitrogen species in the vicinity of this location.

7. Sufficiently high levels of benzene and other aromatics were found at the North Flare Pit to require additional vertical and horizonal sampling by EPNG. Provide additional specifics on the proposed investigation and remediation procedures necessary to properly close both this pit and the South Flare Pit.

If you have any questions regarding the material or information requested in this letter, please call Bill Olson at (505) 827-5885 after October 21. Before providing a specific response to the items addressed in this letter, an additional meeting to discuss this matter could be scheduled if desired by EPNG to speed up resolution of these issues so that physical closure can begin.

Sincerely,

Roger Anderson

Roger Anderson, Acting Chief
Environmental Bureau

cc: OCD Aztec Office

RECEIVED

SEP 17 1991

OIL CONSERVATION DIV.
SANTA FE

El Paso
Natural Gas Company

P. O. BOX 1492
EL PASO, TEXAS 79978
PHONE: 915-541-2600

August 30, 1991

Mr. David Boyer
Environmental Bureau Chief
New Mexico Oil Conservation Division
P.O. Box 2088
Land Office Building
Santa Fe, New Mexico 87504-2088

RE: Pond and Pit Closure Plan for El Paso Natural Gas Company's San Juan River Plant

Dear Mr. Boyer

Thank you for the opportunity to meet with Bill Olson and yourself on June 25, 1991, concerning the proposed closure plan for the ponds and pits at San Juan River Plant. In accordance with your request, attached are two copies of the EM38 ISOPLETH LINES drawing and the revised FIGURE 3 from the Final Closure Plan. Figure 3 was revised to note the datum used and the date the contours were determined.

As we discussed at the meeting, El Paso is planning to contract for the closure of the ponds and pits. Work continues on contract preparation. However, a job showing will not take place, and therefore no work, until the plan is approved by NMOCD.

In order to answer questions raised at our meeting, please consider the following:

1. The raw water pond will also be closed;
2. The north and south flare pits will be both closed;
3. The pump-back pond will remain open until the other closure activities are completed;
4. K.W. Brown & Associates advised that no additional compaction, other than that obtained during cover placement was considered during the bench-scale analysis.
5. The cover system will not be compacted other than that which occurs as a part of placement;
6. An EPNG inspector will be on site to supervise the work and the inspector will verify the correct borrow sources are used. The inspector will also make sure that at least nine inches (9") of each borrow source will be used on the cover system; and,
7. Gypsum will not be utilized as part of the cover system.

Also attached are copies of the analytical results from soil and sludge samples collected in the ponds/pits and water samples collected in monitor wells.

El Paso is ready to perform the activities outlined in the closure plan and further clarified above. I look forward to receiving your approval so El Paso may commence the project. If you have any questions or need additional information please advise.

Very truly yours,

Thomas D. Hutchins

Thomas D. Hutchins, Manager
North Region Compliance Engineering

bc: G. Aragon
G. E. Bauer
S.D. Miller
N. Prince
H. Van
File

El Paso
Natural Gas Company

MEMORANDUM

TO: John Lambdin

DATE: July 2, 1991

FROM: Norman Norvelle

PLACE: North Engineering
Laboratory-Farmington

SUBJECT: SAN JUAN RIVER PLANT MONITOR WELLS

On June 27, 1991, Richard Benson and Dennis Bird sampled the following monitoring wells at San Juan River Plant: W-2, MW-4, P-~~7~~,10 P-8, and P-9. The sample D-2 was a duplicate sample of W-2 to be used for quality control purposes. The following analytical parameters are to be performed on these groundwater samples: EC, pH, nitrate, sulfate, chloride, magnesium, potassium, sodium, benzene, toluene, xylene, ethylbenzene, carbonate, bicarbonate, total alkalinity, and TKN. All bailing and sampling was done with disposable, one-time use equipment and bottles.

All wells were bailed 3 casing volumes. The following information was collected on each well:

MONITOR WELL #	DEPTH TO BOTTOM	DEPTH TO WATER	CASING I.D.
W-2	62' 4"	51' 1"	4"
MW-4	57'	45'	2"
~~P-7~~ P-10	15' 9"	4' 11"	2"
P-8	24' 3"	8' 2"	2"
P-9	26' 4"	10' 9"	2"

Monitor well ~~P-7~~ P-10 had the smell of hydrogen sulfide.

7/10/91 P-7 — Hit bottom at 2.0'

The sample numbers used were N11258 to N11263. The samples were sent to A.T.I. Labs the next day via Federal Express. Samples were stored and shipped at 4 degrees Centigrade. Analysis and shipping was charged to 108-48734-34-001-51-2010. Each tech worked 4 hours overtime each and this will be charged to 108-48734-34-001-11-2010. Attached is the C.O.C., map, sender's copy, and the parameters from K. W. Brown.

Should you have any questions or comments, please let me know.

Norman Norvelle
Norman Norvelle

Enclosures

cc: Richard Benson
Dennis Bird
Tom Hutchins
Sandra Miller
File

FEDERAL EXPRESS

AIRBILL
PACKAGE TRACKING NUMBER
3904532601

SENDER'S COPY

3904532601

ANALYTICAL TECHNOLOGIES INC

SUITE B-13

SATURDAY PICK-UP

HOLIDAY DELIVERY

DESCRIPTION

Economy Two-Day Service (formerly Standard Air) (Delivery by second business day†)

Heavyweight Service (for Extra-Large or any package over 150 lbs.)

30 ☐ ECONOMY TWO-DAY SVC.

70 ☐ HEAVYWEIGHT **

80 ☐ DEFERRED HEAVYWEIGHT **

† Delivery commitment may be later in some areas.

* Declared Value Limit $100

** Call for delivery schedule.

Received At:
1 ☐ Regular Stop
2 ☐ On-Call Stop
3 ☐ Drop Box
4 ☐ B.S.C.
5 ☒ Station

FedEx Emp. No. 122175

Date/Time 8-18

Release Signature:

Declared Value Charge

Other 1

Other 2

Total Charges

041

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PRINTED IN U.S.A.

SENDER'S COPY

ANALYSIS # N11258 - N11263

Table 3. Analytical parameters for soil, sludge, and groundwater samples.

Soil and Sludge Samples

EC
pH
Arsenic*
Barium*
Cadmium*
Chromium*
Chloride
Cyanide
Fluoride
Lead*
Magnesium*
Mercury*
Nitrate
Potassium
Sodium
Selenium*
Silver*
Sulfate
Zinc
Benzene
Toluene
Xylenes
Oil & Grease

Groundwater Samples

EC
pH
Nitrate
Sulfate
Chloride
Magnesium
Potassium
Sodium
Benzene
Toluene
Xylene
Ethylbenzene
CARBONATE
BICARBONATE
TOTAL ALKALINITY
TKN

PER TOM/RITCHIE
6-21-91
CC: SAMMS

* TCLP or EP Toxicity analysis.

equipment decontamination with distilled-water rinse for EC and pH measurements, followed by instrument calibration using known standards. QA/QC procedures for cleaning sampling equipment used to collect soil and sludge samples for organic laboratory analysis were as follows:

- removing all excess soils from the tools
- rinsing with tap water
- rinsing with analytical-grade hexane
- rinsing with analytical-grade acetone
- rinsing with deionized water.

Dedicated bailers will be used to collect groundwater samples. All equipment used to collect groundwater samples, other than the bailers, will be subjected to the same described decontamination rinsing procedures, as appropriate.

In addition to observing field QA/QC procedures, laboratory QA/QC was required. Information concerning laboratory procedures was provided by the contract laboratory for inclusion with laboratory results. The laboratory was required to conduct matrix spikes and analyze duplicate samples. Recovery rates reported for the QA/QC samples will be required to meet the standards specified by the EPA for the given procedure.

Shipment of all samples collected at the site for offsite analyses were tracked using chain-of-custody procedures. Organic samples were preserved at 4°C and shipped to the analyzing laboratory via an overnight carrier.

4.3 DRAINAGE BASIN REMEDIATION AND CLOSURE

Previous investigations have indicated that the drainage basin downgradient from the wastewater impoundments is heavily impacted by salts (KWB&A, 1989). The extent of the salt-affected area can be visually distinguished by the presence of amorphous salts at the soil sur-

El Paso
Natural Gas Company

CHAIN OF CUSTODY RECORD

Project No.

Project Name SAN JUAN RIVER STATION MONITOR wells

Samplers: (Signature) Dennis Bird

Date 6-28-91

Receiving Temp. (°F)

Contract Laboratory ANALYTICAL TECHNOLOGIES, INC
9830 S. 51st STREET
SUITE B-113
PHOENIX AZ 85044

Lab ID	Date	Time	Matrix	Sample Number	Total No. of Containers	Chain of Custody Seals	Intact?	Composite or Grab	G See Attached	BTXE	TKN	NO_3	Remarks
1	6-27-91	15:00	WATER	N11258	4	NO	-	G	X	X	X	X	MONITOR WELL D-2
2	6-27-91	14:50	WATER	N11259	4	NO	-	G	X	X	X	X	MONITOR WELL W-2
3	6-27-91	16:20	WATER	N11260	4	NO	-	G	X	X	X	X	MONITOR WELL MW-4
4	6-27-91	17:15	WATER	N11261	4	NO	-	G	X	X	X	X	MONITOR WELL [illegible] P-10 7/23/91 JJ
5	6-27-91	19:00	WATER	N11262	4	NO	-	G	X	X	X	X	MONITOR WELL P-8
6	6-27-91	18:00	WATER	N11263	4	NO	-	G	X	X	X	X	MONITOR WELL P-9

ATTACHED:

GENERAL CHEMISTRY

ELEC. CONDUCTIVITY	CO_3
pH	HCO_3
SO_4	TOTAL ALKALINITY
Cl	
Mg	
K	
Na	

Relinquished by: (Signature) Dennis Bird
Date/Time 6-28-91 14:40
Received by: (Signature)
Relinquished by: (Signature)
Date/Time
Received by: (Signature)

Relinquished by: (Signature)
Date/Time
Received by: (Signature)
Relinquished by: (Signature)
Date/Time 6/29/91 11:00
Received by: (Signature) Lund Eskelma

Relinquished by: (Signature)
Date/Time
Received for Laboratory by: (Signature)
Date/Time
Remarks: ATI ACC.# 106989

Results & Invoices to:: JOHN LAMBDIN, EPNG; P.O. BOX 4990, FARMINGTON, NM
Charge Code 108-48734-34-001-51-2010
Date Results Reported / by: (Signature)

WHITE-Testing Laboratory YELLOW-EPNG Lab PINK-Field Sampler

san juan repro Form 71-65

Analytical**Technologies,** Inc. 9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 106989

July 18, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499

Project Name/Number: San Juan River Station

Attention: John Lambdin

On 06/29/91, Analytical Technologies, Inc. received a request to analyze **aqueous** sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary H. Tyer
Mary Tyer
Project Manager

M. Barry for
Robert V. Woods
Laboratory Manager

RVW:jat
Enclosure

Analytical**Technologies,** Inc.

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
DATE RECEIVED : 06/29/91
REPORT DATE : 07/17/91
ATI I.D. : 106989

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11258- Well D-2	AQUEOUS	06/27/91
02	N11259- Well W-2	AQUEOUS	06/27/91
03	N11260 - Well MW-4	AQUEOUS	06/27/91
04	N11261- Well P-10	AQUEOUS	06/27/91
05	N11262- Well P-8	AQUEOUS	06/27/91
06	N11263- Well P-9	AQUEOUS	06/27/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	6

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

AnalyticalTechnologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 106989

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN

DATE RECEIVED : 06/29/91

REPORT DATE : 07/17/91

PARAMETER	UNITS	01	02	03	04	05
CARBONATE (CACO3)	MG/L	<1	<1	<1	<1	<1
BICARBONATE (CACO3)	MG/L	113	134	605	1950	505
HYDROXIDE (CACO3)	MG/L	<1	<1	<1	<1	<1
TOTAL ALKALINITY (AS CACO3)	MG/L	113	134	605	1950	505
CHLORIDE	MG/L	610	620	190	260	8000
CONDUCTIVITY, (UMHOS/CM)		7300	7460	4520	15800	33900
NITRATE AS NITROGEN	MG/L	8.0	8.1	<0.06	<0.06	15.6
PH	UNITS	8.0	7.9	6.9	6.9	7.4
SULFATE	MG/L	3400	3600	1200	7100	1300
TOTAL KJELDAHL NITROGEN	MG/L	2.3	1.9	120	0.6	1.0

Analytical **Technologies,** Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 106989

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN

DATE RECEIVED : 06/29/91
REPORT DATE : 07/17/91

PARAMETER	UNITS	06
CARBONATE (CACO3)	MG/L	<1
BICARBONATE (CACO3)	MG/L	179
HYDROXIDE (CACO3)	MG/L	<1
TOTAL ALKALINITY (AS CACO3)	MG/L	179
CHLORIDE	MG/L	930
CONDUCTIVITY, (UMHOS/CM)		148000
NITRATE AS NITROGEN	MG/L	0.60
PH	UNITS	6.4
SULFATE	MG/L	8800
TOTAL KJELDAHL NITROGEN	MG/L	0.5

Analytical**Technologies,** Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
ATI I.D. : 106989

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CARBONATE	MG/L	10698901	<1	<1	NA	NA	NA	NA
BICARBONATE	MG/L		113	117	3	NA	NA	NA
HYDROXIDE	MG/L		<1	<1	NA	NA	NA	NA
TOTAL ALKALINITY	MG/L		113	117	3	NA	NA	NA
CARBONATE	MG/L	10698903	<1	<1	NA	NA	NA	NA
BICARBONATE	MG/L		605	594	2	NA	NA	NA
HYDROXIDE	MG/L		<1	<1	NA	NA	NA	NA
TOTAL ALKALINITY	MG/L		605	594	2	NA	NA	NA
CHLORIDE	MG/L	10750902	240	240	0	500	250	104
CONDUCTIVITY(UMHOS/CM)		10698902	7460	7510	0.7	NA	NA	NA
NITRATE AS NITROGEN	MG/L	10698906	0.60	0.59	2	2.56	2.00	98
PH	UNITS	10698901	8.0	8.0	0	NA	NA	NA
PH	UNITS	10698903	6.9	6.9	0	NA	NA	NA
SULFATE	MG/L	10693101	260	270	4	600	340	100
SULFATE	MG/L	10698903	1200	1100	9	2300	1200	92
TOTAL KJELDAHL NITROGE	MG/L	10698906	0.5	0.6	18	2.8	2.0	115

Acceptable.
7/23/91

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

METALS RESULTS

ATI I.D. : 106989

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
DATE RECEIVED : 06/29/91
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
REPORT DATE : 07/17/91

PARAMETER	UNITS	01	02	03	04	05
POTASSIUM	MG/L	8.3	6.8	5.0	12.2	17.3
MAGNESIUM	MG/L	134	140	62.6	162	256
SODIUM	MG/L	1400	1410	933	4380	9280

AnalyticalTechnologies, Inc.

METALS RESULTS

ATI I.D. : 106989

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN

DATE RECEIVED : 06/29/91
REPORT DATE : 07/17/91

PARAMETER	UNITS	06
POTASSIUM	MG/L	13.4
MAGNESIUM	MG/L	181
SODIUM	MG/L	3720

Analytical**Technologies,** Inc.

METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
ATI I.D. : 106989

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
POTASSIUM	MG/L	10698901	8.3	8.3	0	57.4	50.0	98
MAGNESIUM	MG/L	10698901	134	134	0	379	250	98
SODIUM	MG/L	10698901	1400	1400	0	1860	500	92

Acceptable
7/27/91
JJ.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \text{ X } 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \text{ X } 100$$

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10698901

TEST : BTEX & MTBE (EPA METHOD 602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
CLIENT I.D. : N11258
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 06/27/91
DATE RECEIVED : 06/29/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/09/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
ETHYLBENZENE	<0.5
TOTAL XYLENES	<0.5
METHYL-t-BUTYL ETHER	<2.5

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	102

Analytical **Technologies,** Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10698902

TEST : BTEX & MTBE (EPA METHOD 602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
CLIENT I.D. : N11259
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 06/27/91
DATE RECEIVED : 06/29/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/09/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
ETHYLBENZENE	<0.5
TOTAL XYLENES	<0.5
METHYL-t-BUTYL ETHER	<2.5
SURROGATE PERCENT RECOVERIES	
BROMOFLUOROBENZENE (%)	102

Analytical **Technologies**, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10698903

TEST : BTEX & MTBE (EPA METHOD 602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
CLIENT I.D. : N11260
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 06/27/91
DATE RECEIVED : 06/29/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/09/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
ETHYLBENZENE	<0.5
TOTAL XYLENES	<0.5
METHYL-t-BUTYL ETHER	<2.5

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	99

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10698904

TEST : BTEX & MTBE (EPA METHOD 602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
CLIENT I.D. : N11261
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 06/27/91
DATE RECEIVED : 06/29/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/09/91
UNITS : UG/L
DILUTION FACTOR : 250

COMPOUNDS	RESULTS
BENZENE	7400
TOLUENE	140
ETHYLBENZENE	260
TOTAL XYLENES	910
METHYL-t-BUTYL ETHER	<625

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	103

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10698905

TEST : BTEX & MTBE (EPA METHOD 602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
CLIENT I.D. : N11262
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 06/27/91
DATE RECEIVED : 06/29/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/09/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
ETHYLBENZENE	<0.5
TOTAL XYLENES	<0.5
METHYL-t-BUTYL ETHER	<2.5

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	106

Analytical **Technologies,** Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10698906

TEST : BTEX & MTBE (EPA METHOD 602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
CLIENT I.D. : N11263
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 06/27/91
DATE RECEIVED : 06/29/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/09/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
ETHYLBENZENE	<0.5
TOTAL XYLENES	<0.5
METHYL-t-BUTYL ETHER	<2.5

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	103

Analytical**Technologies,** Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : BTEX & MTBE (EPA METHOD 602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 106989
DATE EXTRACTED : 07/09/91
DATE ANALYZED : 07/09/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
ETHYLBENZENE	<0.5
TOTAL XYLENES	<0.5
METHYL-t-BUTYL ETHER	<2.5

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	98

Acceptable
7/23/91

QUALITY CONTROL DATA

ATI I.D. : 106989

TEST : BTEX & MTBE (EPA METHOD 602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN
REF I.D. : 10799805

DATE ANALYZED : 07/10/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	<0.5	10	9.0	90	8.8	88	2
TOLUENE	<0.5	10	9.5	95	9.2	92	3
ETHYLBENZENE	<0.5	10	9.7	97	9.5	95	2
TOTAL XYLENES	<0.5	30	28	93	28	93	0
METHYL-t-BUTYL ETHER	<2.5	20	16	80	15	75	6

Acceptable
7/23/91

$$\%\ \text{Recovery} = \frac{\text{(Spike Sample Result - Sample Result)}}{\text{Spike Concentration}} \text{ X } 100$$

$$\text{RPD (Relative \% Difference)} = \frac{\text{(Spiked Sample Result - Duplicate Spike Sample Result)}}{\text{Average of Spiked Sample}} \text{ X } 100$$

El Paso
Natural Gas Company

MEMORANDUM

TO: Sandra Miller AP

FROM: John Lambdin

DATE: April 1, 1991

PLACE: North Engineering
Laboratory/Farmington

RE: <u>San Juan River Plant Pits & Ponds Analytical Results</u>

Please find enclosed the referenced results for samples collected on January 22, 1991. The TCLP metals analyses are now finished which completes all the requested analyses on these samples You will also find my data assessment summary attached.

Let me know if you have any questions.

John Lambdin

cc: file

NORTH REGION LABORATORY CONTRACT LABORATORY DATA REVIEW
LABORATORY DA[illegible] EVALUATION: OVERALL ASSM[illegible]T

DATE: 04/01/91
SDG No: 103534
BY: J.A. LAMBDIN
FILE: N10026.WK2

LABORATORY: ATI
SAMPLES: 10
ANALYTE: TCLP METALS
ANALYSIS DATE: 03-26-91
Page: 2

		DATA ASSESSMENT SUMMARY	COMMENTS
1	HOLDING TIMES & TEMPERATURE	O	
2	CALIBRATIONS	N/A	
3	BLANKS	O	
4	LABORATORY CONTROL SAMPLES	O	
5	DUPLICATE ANALYSIS	O	As Noted
6	MATRIX SPIKES	O	
7	SAMPLE VERIFICATION (C.O.C.)	O	
8	FIELD SAMPLES	O	
9	OTHER QC	O	
10	OVERALL ASSMENT	O	

O = Data had no problems/or qualified due to minor problems
M = Data qualified due to major problems.
Z = Data unacceptable.
X = Problems, but not affected data.

ACTION ITEMS: Any value with an unacceptable % Recovery or RPD should be treated as an estimate

AREAS OF CONCERN: NONE

NOTABLE PERFORMANCE: Complex soil matrix noted!

The signature below indicates that the data for this analyses group has been reviewed by a qualified chemist and and evaluated as stated.

Approved by:
Laboratory Coordinator/Chemist

Date: 4/01/91

NORTH REGION LABORATORY CONTRACT LABORATORY DATA REVIEW
LABORATORY DA[illegible] EVALUATION: FIELD SAMPLE[illegible]

DATE: 04/01/91
ACCESSION #: 103534
BY: J.A. LAMBDIN
FILE: N10026.WK2

LABORATORY: ATI
SAMPLES: 10
ANALYTE: TCLP METALS
REPORT DATE: 03-26-91

FIELD DUPLICATES

N10035 and Duplicate N10043 - Pond #2 SOIL Composite

TEST	UNITS	N10035 SAMPLE RESULT (S)	N10043 DUPLICATE RESULT (D)	RPD (%)	ACCEPTABLE YES	NO	CONTROL
EPNG ID #		N10035	N10043				
ATI ID #		05	09				
Silver	MG/L	< 0.010	< 0.010	0	X		+/- 35%
Arsenic	MG/L	< 0.1	< 0.1	0	X		+/- 35%
Barium	MG/L	0.162	0.161	1	X		+/- 35%
Cadmium	MG/L	< 0.005	< 0.005	0	X		+/- 35%
Chromium	MG/L	< 0.010	0.013	-26	X		+/- 35%
Mercury	MG/L	< 0.0002	< 0.0002	0	X		+/- 35%
Lead	MG/L	< 0.05	< 0.05	0	X		+/- 35%
Selenium	MG/L	< 0.1	< 0.1	0	X		+/- 35%
Zinc	MG/L	0.072	0.093	-25	X		+/- 35%
N10037 and Duplicate N10045 - Pond #2 SLUDGE Composite							
EPNG ID #		N10037	N10045				
ATI ID #		06	10				
Silver	MG/L	< 0.010	< 0.010	0	X		+/- 35%
Arsenic	MG/L	< 0.1	< 0.1	0	X		+/- 35%
Barium	MG/L	0.296	0.262	12	X		+/- 35%
Cadmium	MG/L	< 0.005	0.005	0	X		+/- 35%
Chromium	MG/L	0.036	0.019	62		X	+/- 35%
Mercury	MG/L	< 0.0002	< 0.0002	0	X		+/- 35%
Lead	MG/L	< 0.05	< 0.05	0	X		+/- 35%
Selenium	MG/L	< 0.1	< 0.1	0	X		+/- 35%
Zinc	MG/L	0.180	0.115	44		X	+/- 35%

Comments: Data marked with a "No" in the acceptance column should be treated as estimates. The variability seen here in not unreasonable considering the nature of the sample matrix.

AnalyticalTechnologies, Inc. 2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 103534

March 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499

Project Name/Number: San Juan River

Attention: John Lambdin

On 03/04/91, Analytical Technologies, Inc. received a request to analyze soil sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

The results reported for TCLP analyses are the actual measured values, and are not corrected for matrix spike recovery bias. The matrix spike recovery results for TCLP analyses are included in this report.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Jane Humphress Foote
Jane Humphress Foote
Project Manager

Robert V. Woods
Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure

103534

TC Metals

El Paso
Natural Gas Company

ATI #101792

CHAIN OF CUSTODY RECORD

Project No.

Project Name: San Juan River Station Ponds

Samplers: (Signature) Charles R. Padilla Date: 1-23-91
Norman K Norvelle / Dennis P. Bird Lupe Rangel

Requested Analysis

Remarks: SENT TO ANALYTICAL Technologies, PHOENIX

SAN JUAN RIVER STATION (SJRS)·

		Date	Time	Comp.	GRAB	Sample Number	Type and No. of Sample Containers	Preservation Technique	SEE ATTACHED	CUSTODY SEALS			Remarks
	1	1-22-91	1600	X		N10026	G	4°c	X	X			SJRS NORTH FLARE PIT SOIL COMP
1)	2	"	"	X		N10027	P	"	X	X			SJRS " " " " "
	3	"	"	X		N10028	G	"	X	X			SJRS SOUTH FLARE PIT SOIL COMP
2)	4	"	"	X		N10029	P	"	X	X			SJRS " " " " "
	5	"	"	X		N10030	G	"	X	X			SJRS POND#1 SOIL COMPOSITE
3)	6	"	"	X		N10031	P	"	X	X			SJRS " " "
	7	"	"	X		N10032	G	"	X	X			SJRS POND#[illegible] SLUDGE "
4)	8	"	"	X		N10033	P	"	X	X			SJRS " " "
	9	"	"	X		N10034	G	"	X	X			SJRS POND#2 SOIL "
5)	10	"	"	X		N10035	P	"	X	X			SJRS POND#2 SOIL "
	11	"	"	X		N10036	G	"	X	X			SJRS POND#2 SLUDGE "
6)	12	"	"	X		N10037	P	"	X	X			SJRS " " " "
	13	"	"	X		N10038	G	"	X	X			SJRS POND#3 SOIL "
7)	14	"	"	X		N10039	P	"	X	X			SJRS " " "
	15	"	"	X		N10040	G	"	X	X			SJRS " SLUDGE "
8)	16	"	"	X		N10041	P	"	X	X			SJRS " " "

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Norman K Norvelle	1-23-91 10:00				

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks:
		Marcie Smith	1-24-91 10:15am	

Carrier Co: SEND INVOICE TO JOHN LAMBDIN
P.O. BOX 4990, EL PASO NATURAL GAS CO

Carrier Phone No.

Date Results Reported / by: (Signature)

103534

El Paso
Natural Gas Company

CHAIN OF CUSTODY RECORD

ATI # 101792

Project No.:

Project Name: SAN JUAN RIVER STATION PONDS

Samplers: (Signature) Norman K. Nowell / Dennis P. Bird Charles R. Padilla Lupe Rangel

Date: 1-23-91

Remarks: SENT TO ANALYTICAL TECHNOLOGIES, PHOENIX

	Date	Time	Comp.	GRA8	Sample Number	Type and No. of Sample Containers	Preservation Technique	SEE ATTACHED	CUSTODY SEALS	Requested Analysis		Remarks
17	1-22-91	16:00	X		N1 00 42	G	4°C	X	X			SJRS SOIL Duplicate
9) 18	11	"	X		N1 00 43	P	"	X	X			SJRS SOIL Duplicate
19	"	"	X		N1 00 44	G	"	X	X			SJRS SLUDGE Duplicate
10) 20	"	"	X		N1 00 45	P	"	X	X			SJRS SLUDGE Duplicate
21	"	"	X		N1 00 46	G	"	X	X			SJRS GLASS - 8 oz BLANK Field
22	"	"	X		N1 00 47	P	"	X	X			SJRS PLASTIC - 8 oz Field BLANK
23	"	"	X		N1 00 48	P	"	X	X			SJRS PLASTIC - oz Field BLANK

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Norman K. Nowell	1-23-91 / 10:00				

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks:
		Marcia Smith	1-24-91 / 10:15am	

Carrier Co: SEND INVOICE + RESULTS TO JOHN LAMBDIN, P.O. BOX 4990, EPNG [illegible]

Carrier Phone No.

Date Results Reported / by: (Signature)

Air Bill No.: [illegible] 2144

AnalyticalTechnolog Inc.

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR

DATE RECEIVED : 01/24/91
REPORT DATE : 03/26/91

ATI I.D. : 103534

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N10027 (101792-02) NORTH FLARE Pit	SOIL	01/22/91
02	N10029 (101792-04) South FLARE Pit	SOIL	01/22/91
03	N10031 (101792-06) Pond #1 (Comp)	SOIL	01/22/91
04	N10033 (101792-08) Pond #1 (sludge)	SOIL	01/22/91
05	N10035 (101792-10) Pond #2 (comp.)	SOIL	01/22/91
06	N10037 (101792-12) Pond #2 (Sludge)	SOIL	01/22/91
07	N10039 (101792-14) Pond #3 (composite)	SOIL	01/22/91
08	N10041 (101792-16) Pond #3 (sludge)	SOIL	01/22/91
09	N10043 (101792-18) Duplicate: Pond #2 (Comp)	SOIL	01/22/91
10	N10045 (101792-20) Duplicate: Pond #2 (sludge)	SOIL	01/22/91

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	10

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologi[illegible]nc.

METALS RESULTS

ATI I.D. : 103534

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
DATE RECEIVED : 01/24/91
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
REPORT DATE : 03/26/91

PARAMETER	UNITS	01	02	03	04	05
SILVER (IN TCLP)	MG/L	<0.010	<0.010	<0.010	<0.010	<0.010
ARSENIC (IN TCLP)	MG/L	<0.1	<0.1	<0.1	<0.1	<0.1
BARIUM (IN TCLP)	MG/L	0.064	0.085	0.200	0.180	0.162
CADMIUM (IN TCLP)	MG/L	0.005	<0.005	0.010	<0.005	<0.005
CHROMIUM (IN TCLP)	MG/L	<0.010	0.192	0.013	0.027	<0.010
MERCURY (IN TCLP)	MG/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
LEAD (IN TCLP)	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
SELENIUM (IN TCLP)	MG/L	<0.1	<0.1	<0.1	<0.1	<0.1
ZINC (IN TCLP)	MG/L	0.186	0.406	0.062	0.059	0.072

METALS RESULTS

ATI I.D. : 103534

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
DATE RECEIVED : 01/24/91
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
REPORT DATE : 03/26/91

PARAMETER	UNITS	06	07	08	09	10
SILVER (IN TCLP)	MG/L	<0.010	<0.010	<0.010	<0.010	<0.010
ARSENIC (IN TCLP)	MG/L	<0.1	<0.1	<0.1	<0.1	<0.1
BARIUM (IN TCLP)	MG/L	0.296	0.103	0.113	0.161	0.262
CADMIUM (IN TCLP)	MG/L	<0.005	<0.005	0.008	<0.005	0.005
CHROMIUM (IN TCLP)	MG/L	0.036	<0.010	0.017	0.013	0.019
MERCURY (IN TCLP)	MG/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
LEAD (IN TCLP)	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
SELENIUM (IN TCLP)	MG/L	<0.1	<0.1	<0.1	<0.1	<0.1
ZINC (IN TCLP)	MG/L	0.180	0.209	0.143	0.093	0.115

Analytical Technolog[illegible] Inc.

METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
ATI I.D. : 103534

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER (IN TCLP)	MG/L	10353402	<0.010	<0.010	NA	0.822	1.00	82
ARSENIC (IN TCLP)	MG/L	10353402	<0.1	<0.1	NA	1.0	1.0	100
BARIUM (IN TCLP)	MG/L	10353402	0.085	0.096	12	1.00	1.00	92
CADMIUM (IN TCLP)	MG/L	10353409	<0.005	<0.005	NA	0.956	1.00	96
CADMIUM (IN TCLP)	MG/L	10353402	<0.005	<0.005	NA	0.999	1.00	100
CHROMIUM (IN TCLP)	MG/L	10353402	0.192	0.200	4	1.04	1.00	85
MERCURY (IN TCLP)	MG/L	10353402	<0.0002	<0.0002	NA	0.0049	0.0050	98
LEAD (IN TCLP)	MG/L	10353402	<0.05	<0.05	NA	0.89	1.00	89
SELENIUM (IN TCLP)	MG/L	10353402	<0.1	<0.1	NA	1.0	1.0	100
ZINC (IN TCLP)	MG/L	10353402	0.406	0.363	11	1.45	1.00	104
ZINC (IN TCLP)	MG/L	10353405	0.072	0.075	4	1.10	1.00	103

Looks Good!
4/1/91

$$\% \text{ Recovery} = \frac{\text{(Spike Sample Result - Sample Result)}}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{\text{(Sample Result - Duplicate Result)}}{\text{Average Result}} \times 10$$

BTEX (Non-aqueous)

El Paso
Natural Gas Company

ATI #101792

CHAIN OF CUSTODY RECORD

Project No.:

Project Name: SAN JUAN RIVER STATION PONDS

Samplers: (Signature) Norman R Norvell / Dennis P. Bird Lupe Rangel Charles R. Padilla Date: 1-23-91

Remarks: SENT TO ANALYTICAL Technologies, PHOENIX

	Date	Time	Comp.	GRAB	Sample Number	Type and No. of Sample Containers	Preservation Technique	SEE ATTACHED	CUSTODY SEALS			Remarks
												SAN JUAN RIVER STATION (SJRS)
1	1-22-91	1600	X		N10026	G	4°C	X	X			SJRS NORTH FLARE PIT SOIL COMPOS
2	"	"	X		N10027	P	"	X	X			SJRS " " " "
3	"	"	X		N10028	G	"	X	X			SJRS SOUTH FLARE PIT SOIL COMPOS
4	"	"	X		N10029	P	"	X	X			SJRS " " " " "
5	"	"	X		N10030	G	"	X	X			SJRS POND#1 SOIL COMPOSITE
6	"	"	X		N10031	P	"	X	X			SJRS " " "
7	"	"	X		N10032	G	"	X	X			SJRS POND#1 SLUDGE "
8	"	"	X		N10033	P	"	X	X			SJRS " " "
9	"	"	X		N10034	G	"	X	X			SJRS POND#2 SOIL "
10	"	"	X		N10035	P	"	X	X			SJRS POND#2 SOIL "
11	"	"	X		N10036	G	"	X	X			SJRS POND#2 SLUDGE "
12	"	"	X		N10037	P	"	X	X			SJRS " " " "
13	"	"	X		N10038	G	"	X	X			SJRS POND#3 SOIL "
14	"	"	X		N10039	P	"	X	X			SJRS " " "
15	"	"	X		N10040	G	"	X	X			SJRS " SLUDGE "
16	"	"	X		N10041	P	"	X	X			SJRS " " "

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Norman R Norvell	1-23-91 10:00				

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks:
		Marcee Smith	1-24-91 10:15am	

Carrier Co: SEND INVOICE TO JOHN LAMBDIN
P.O. BOX 4990, EL PASO NATURAL GAS CO

Air Bill No.: FARMINGTON, NM (505) 599-2141

Carrier Phone No.:

Date Results Reported / by: (Signature)

El Paso
Natural Gas Company

ATI # 101792

CHAIN OF CUSTODY RECORD

Project No.:

Project Name: SAN JUAN RIVER STATION PONDS

Samplers: (Signature) Norman K. Norvelle / Charles R. Padilla / Dennis P. BIRD Lupe Rangel Date: 1-23-91

Remarks: SENT TO ANALYTICAL TECHNOLOGIES, PHOENIX

	Date	Time	Comp.	GRA8	Sample Number	Type and No. of Sample Containers	Preservation Technique	SEE ATTACHED CUSTODY SEALS			Requested Analysis / Remarks
17	1-22-91	16:00	X		N1 00 42	G	4°C	X	X			SJRS SOIL Duplicate
18	"	"	X		N1 00 43	P	"	X	X			SJRS SOIL Duplicate
19	"	"	X		N1 00 44	G	"	X	X			SJRS SLUDGE Duplicate
20	"	"	X		N1 00 45	P	"	X	X			SJRS SLUDGE Duplicate
21	"	"	X		N1 00 46	G	"	X	X			SJRS GLASS - 8oz BLANK Field
22	"	"	X		N1 00 47	P	"	X	X			SJRS PLASTIC - 8oz Field Blank
23	"	"	X		N1 00 48	P	"	X	X			SJRS PLASTIC - oz Field Blank

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Norman K. Norvelle	1-23-91 10:00				

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks:
		Marcia Smith	1-24-91 10:15am	

Carrier Co: SEND INVOICE + RESULTS TO JOHN LAMBDIN, P.O. BOX 4990, EPNG @ Air Bill No.: [illegible] 2144

Carrier Phone No.:

Date Results Reported / by: (Signature)

Analytical Technologie[illegible]nc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10179201

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N10026
SAMPLE MATRIX : NON-AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/28/91
DATE ANALYZED : 01/29/91
UNITS : MG/KG
DILUTION FACTOR : 5

COMPOUNDS	RESULTS
BENZENE	1.2 ppm
TOLUENE	5.6
ETHYLBENZENE	1.5
TOTAL XYLENES	14

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	119

Sample ID

01 = N10026 = NORTH FLARE Pit Soil Composite

Analytical Technologi[illegible] Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10179203

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N10028
SAMPLE MATRIX : NON-AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/28/91
DATE ANALYZED : 01/29/91
UNITS : MG/KG
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	0.11
ETHYLBENZENE	0.11
TOTAL XYLENES	0.68

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	124

Sample ID

03 = N10028 = South FLARE Pit Soil Composite

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10179205

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N10030
SAMPLE MATRIX : NON-AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/28/91
DATE ANALYZED : 01/29/91
UNITS : MG/KG
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	105

Sample ID

05 = N10030 = Pond #1 Soil Composite

Analytical Technologie[illegible]c.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10179207

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N10032
SAMPLE MATRIX : NON-AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/28/91
DATE ANALYZED : 01/29/91
UNITS : MG/KG
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	99

Sample ID

07 = N10032 = Pond #1 Sludge Composite

Analytical**Technologie** nc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10179209

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N10034
SAMPLE MATRIX : NON-AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/28/91
DATE ANALYZED : 01/29/91
UNITS : MG/KG
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	101

Sample ID

69 = N10034 = Pond #2 Soil Composite

Analytical Technologi[illegible]nc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10179211

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N10036
SAMPLE MATRIX : NON-AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/28/91
DATE ANALYZED : 01/29/91
UNITS : MG/KG
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	100

<u>Sample ID</u>

11 = N10036 = Pond #2 Sludge Composite

AnalyticalTechnologi[illegible]nc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10179213

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N10038
SAMPLE MATRIX : NON-AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/28/91
DATE ANALYZED : 01/28/91
UNITS : MG/KG
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025
SURROGATE PERCENT RECOVERIES	
BROMOFLUOROBENZENE (%)	102

Sample ID

13 = N10038 = Pond #3 Soil Composite

Analytical Technologie[illegible]nc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10179215

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N10040
SAMPLE MATRIX : NON-AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/28/91
DATE ANALYZED : 01/29/91
UNITS : MG/KG
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	94

Sample ID

15 = N10040 = Pond #3 Sludge Composite

AnalyticalTechnologi nc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10179217

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N10042
SAMPLE MATRIX : NON-AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/28/91
DATE ANALYZED : 01/29/91
UNITS : MG/KG
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	88

Sample ID

17 = N10042 = Duplicate; Pond #2 Soil

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10179219

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N10044
SAMPLE MATRIX : NON-AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/28/91
DATE ANALYZED : 01/29/91
UNITS : MG/KG
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	100

Sample ID

19 = N10044 = Duplicate : Pond #2 Sludge

Analytical Technologie[illegible]nc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101792
DATE EXTRACTED : 01/28/91
DATE ANALYZED : 01/28/91
UNITS : MG/KG
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	102

Sample ID

Blank

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : BTEX (8020)

		ATI I.D.	: 101792
CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE EXTRACTED	: 01/28/91
PROJECT #	: (NONE)	DATE ANALYZED	: 01/29/91
PROJECT NAME	: SAN JUAN RVR	UNITS	: MG/KG
CLIENT I.D.	: REAGENT BLANK	DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	97

QUALITY CONTROL DATA

ATI I.D. : 101792

TEST : BTEX (8020)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
REF I.D. : 10179213

DATE ANALYZED : 01/28/91
SAMPLE MATRIX : NON-AQUEOU
UNITS : MG/KG

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	<0.025	1.0	0.98	98	0.84	84	15
TOLUENE	<0.025	1.0	1.0	100	0.94	94	6
ETHYL BENZENE	<0.025	1.0	0.97	97	0.90	90	7
XYLENES	<0.025	3.0	2.9	97	2.7	90	7

$$\text{\% Recovery} = \frac{\text{(Spike Sample Result - Sample Result)}}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{\text{(Spiked Sample Result - Duplicate Spike Sample Result)}}{\text{Average of Spiked Sample}} \times 100$$

NORTH REGION LABORATORY CONTRACT LABORATORY DATA REVIEW
LABORATORY DA[illegible] EVALUATION: OVERALL ASSM[illegible]T

DATE: 02/25/91
SDG No: 101792
BY: J.A. LAMBDIN
FILE: N10026.WK1

LABORATORY: ATI
SAMPLES: 23
ANALYTE: VARIOUS
ANALYSIS DATE: 10-03-9[illegible] 2/21/91
Page: 2 13

		DATA ASSESSMENT SUMMARY	COMMENTS
1	HOLDING TIMES & TEMPERATURE	O	
2	CALIBRATIONS	N/A	
3	BLANKS	O	Bottle blanks acceptable
4	LABORATORY CONTROL SAMPLES	O	SURROGATE Recoveries Acceptable
5	DUPLICATE ANALYSIS/LAB and Field	O	As noted.
6	MATRIX SPIKES	O	cyanide %R low, Mercury %R low + noted, Selenium %R low
7	SAMPLE VERIFICATION (C.O.C.)	O	
8	FIELD SAMPLES	O	
9	OTHER QC	O	
10	OVERALL ASSMENT	O	

O = Data had no problems/or qualified due to minor problems
M = Data qualified due to major problems.
Z = Data unacceptable.
X = Problems, but not affected data.

ACTION ITEMS: Any value with an unacceptable % Recovery OR RPD should be treated as an estimate.

AREAS OF CONCERN: NONE

NOTABLE PERFORMANCE: Complex matrix making these samples difficult to deal with.

The signature below indicates that the data for this analyses group has been reviewed by a qualified chemist and and evaluated as stated.

Approved by: John
Laboratory Coordinator/Chemist

Date: 2/27/91

El Paso
Natural Gas Company

MEMORANDUM

O: John Lambdin

FROM: Norman Norvelle

DATE: July 2, 1991

PLACE: North Engineering
Laboratory-Farmington

SUBJECT: SAN JUAN RIVER PLANT PONDS

On June 26, 1991, Richard Benson and Dennis Bird sampled the following ponds at San Juan River Plant: Pond 1, Raw Water Pond and Seep (Recycle) Pond. The following analyses were to be performed on each sample: 8 EP TOX metals, aromatic hydrocarbons (8020) and chlorinated hydrocarbons (8010). A one point grab sample was taken about 8 feet from the shore.

The samples were stored and shipped at 4 degrees Centigrade. Samples were shipped to A.T.I. Labs the same day they were collected via Federal Express. The analytical testing and shipping were charged to 108-48734-34-001-51-2010.

Attached is a copy of the C.O.C. and a map. Should you have any questions, please let me know.

Norman Norvelle

Enclosures

cc: Richard Benson
Dennis Bird
Tom Hutchins
Sandra Miller
File

An. .calTechnologies,Inc.
Phoenix, Arizona

Chain of Custody

DATE 6-26-91 PAGE 1 OF 1

PROJECT MANAGER: John Lambdin

COMPANY: EL PASO NATURAL GAS company
ADDRESS: PO BOX 4990
FARMINGTON, NM 87499

BILL TO: John Lambdin
COMPANY: PO BOX 4990
ADDRESS: FARMINGTON, NM 87499

Dennis Bird (505) 599-2137
SAMPLERS: (Signature) PHONE NUMBER

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons (418.1)		(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE (MOD 8015/8020)	~~BTXE (8020)~~	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	MTBE		Pesticides/PCB (608/8080)	Herbicides (615/8150)			Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)				SDWA Primary Standards	SDWA Secondary Standards	SDWA Volatiles (502.1/503.1)		The 13 Priority Pollutant Metals	The 8 EP Tox Metals by EP Tox Prep. (1310)	The 8 EP Tox Metals by Total Digestion	The 8 EP Tox Metals by TOTALS			NUMBER OF CONTAINERS
N11242, POND 1	6-25-91	11:25	WATER	1					X	X	X																			X			3
N11243, RAW WATER POND	6-25-91	11:00	WATER	2					X	X	X																			X			3
N11244, SEEP POND	6-25-91	11:50	WATER	3					X	X	X																			X			3

PROJECT INFORMATION

PROJECT NO: SAN JUAN
PROJECT NAME: RIVER STATION
P.O. NO. /
SHIPPED VIA:
SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI ☐ RETURN

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS	9
CHAIN OF CUSTODY SEALS	NONE
INTACT?	
RECEIVED GOOD COND./COLD	
LAB NUMBER	106899

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

TAT: [✓ (NORMAL)] (RUSH) ☐ 24 ☐ 48 ☐ 72 ☐ 1 WEEK

Comments: CHARGE WORK ORDER NUMBER
108-48734-34-001-31-2010

RELINQUISHED BY: 1.	**RELINQUISHED BY: 2.**	**RELINQUISHED BY: 3.**
Signature: Dennis Bird Time: 13:45	Signature: Time:	Signature: Time:
Printed Name: DENNIS BIRD Date 6-25-91	Printed Name: Date	Printed Name: Date
Company:	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: MARGUERITE CARRISON Date:
Company:	Company:	Analytical Technologies, Inc. 6/26/91

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

ylicalTechnologies, Inc.
Phoenix, Arizona

Chain of Custody

DATE 6-24-91 PAGE 1 OF 1

PROJECT MANAGER: John Lambdin

COMPANY: EL PASO NATURAL GAS COMPANY
ADDRESS: P.O. BOX 4990
FARMINGTON, NM 87499

BILL TO: John Lambdin
COMPANY: P.O. BOX 4990
ADDRESS: FARMINGTON, NM 87499

Dennis Bird
SAMPLERS: (Signature)

(505) 599-2137
PHONE NUMBER

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons (418.1)	(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE (MOD 8015/8020)	BTXE (8020)	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	MTBE	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	SDWA Primary Standards	SDWA Secondary Standards	SDWA Volatiles (502.1/503.1)	The 13 Priority Pollutant Metals	The 8 EP Tox Metals by EP Tox Prep. (1310)	The 8 EP Tox Metals by Total Digestion	The 8 EP Tox Metals by TCLP (1311)	NUMBER OF CONTAINERS
N11242, POND 1	6-25-91	11:25	WATER						X	X											X		3
N11243, RAW WATER POND	6-25-91	11:00	WATER						X	X											X		3
N11244, SEEP POND	6-25-91	11:50	WATER						X	X											X		3

PROJECT INFORMATION

PROJECT NO: SAN JUAN
PROJECT NAME: RIVER STATION
P.O. NO. /
SHIPPED VIA:
SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI ☐ RETURN

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS	9
CHAIN OF CUSTODY SEALS	NONE
INTACT?	
RECEIVED GOOD COND./COLD	
LAB NUMBER	

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

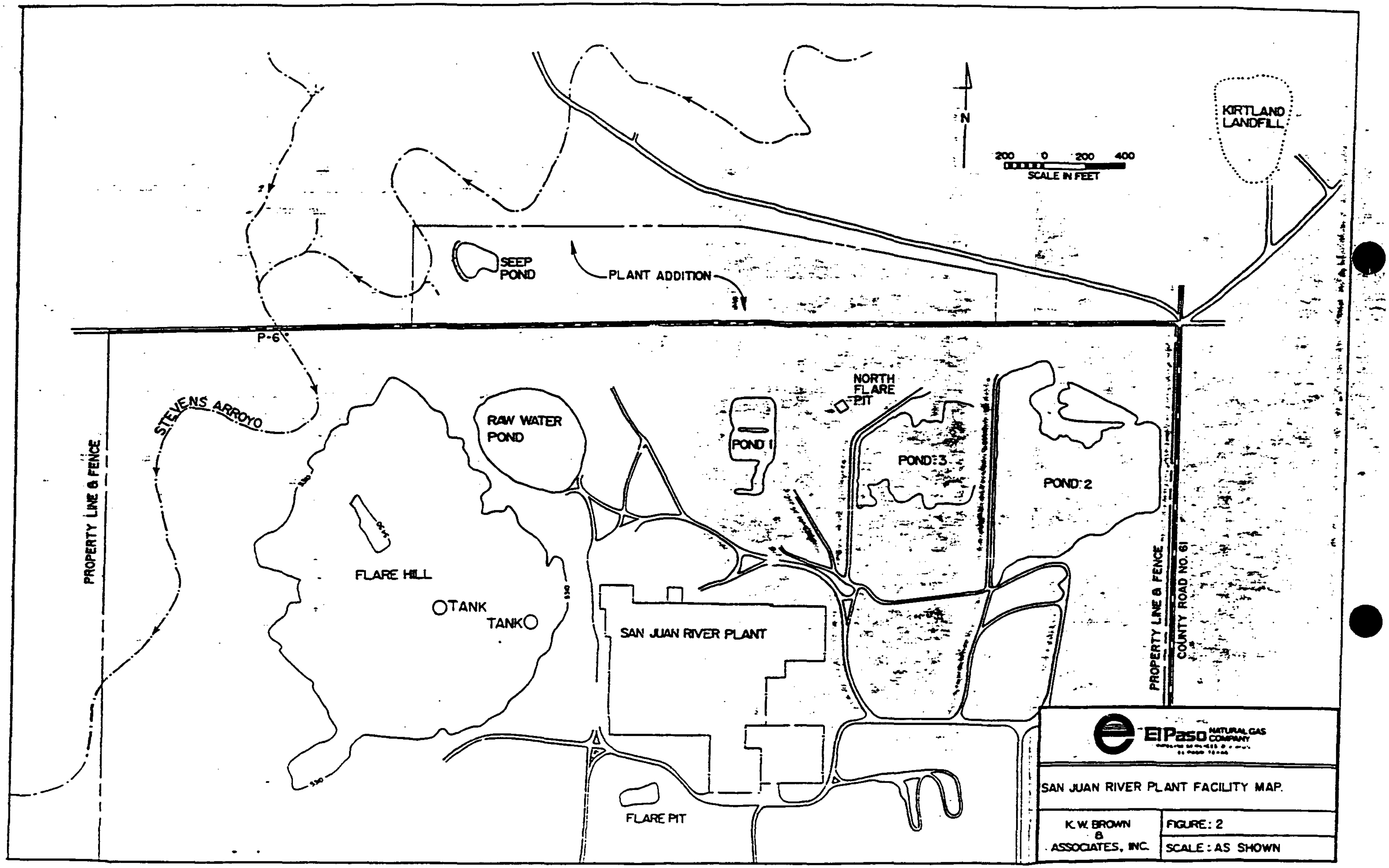
TAT [✓ NORMAL] (RUSH) ☐ 24 ☐ 48 ☐ 72 ☐ 1 WEEK

Comments: CHARGE WORK ORDER NUMBER
108-48734-34-001-51-2070

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Dennis Bird Time: 13:45	Signature: Time:	Signature: Time:
Printed Name: DENNIS BIRD Date 6-25-91	Printed Name: Date	Printed Name: Date
Company:	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC.• Pink - ORIGINATOR



El Paso NATURAL GAS COMPANY

SAN JUAN RIVER PLANT FACILITY MAP

K.W. BROWN
&
ASSOCIATES, INC.

FIGURE: 2

SCALE: AS SHOWN

Analytical**Technologies,** Inc. 9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 106899

July 22, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499

Project Name/Number: San Juan River

Attention: John Lambdin

On 06/26/91, Analytical Technologies, Inc. received a request to analyze **aqueous** sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Method 601/602 analyses were performed by ATI, San Diego.

Sample N11244 Seep Pond, contains approximately 60% solid crystals. This solid layer was not broken down during the digestion for graphite furnace analysis. Per your instruction all metal values reported for this sample are from the liquid layer only.

ATI uses Scandium as an internal standard for ICP analyses. Low Scandium recovery was reported for samples N11242, Pond 1 and N11244, Seep Pond. Redigestion and reanalysis on dilutions did not improve Scandium recovery. Matrix interference is suspected.

Due to matrix interference Selenium by graphite furnace and ICP analyses for samples N11242, Pond 1 and N11244, Seep Pond were run at a dilution. Detection limits were raised accordingly.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary A. Tyer
Mary Tyer
Project Manager

Robert V. Woods
Robert V. Woods
Laboratory Manager

Lorraine Davis
Lorraine Davis
QA Coordinator

RVW:jat
Enclosure

Analytical**Technologies,** Inc.

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
DATE RECEIVED : 06/26/91
REPORT DATE : 07/22/91
ATI I.D. : 106899

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11242, POND 1	AQUEOUS	06/25/91
02	N11243, RAW WATER POND	AQUEOUS	06/25/91
03	N11244, SEEP POND	AQUEOUS	06/25/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	3

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical**Technologies,** Inc.

METALS RESULTS

ATI I.D. : 106899

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR

DATE RECEIVED : 06/26/91
REPORT DATE : 07/22/91

PARAMETER	UNITS	01	02	03
SILVER	MG/L	<0.10	<0.010	<0.040
ARSENIC	MG/L	<0.005	0.005	<0.05
BARIUM	MG/L	<0.10	0.114	0.119
CADMIUM	MG/L	<0.05	<0.005	<0.020
CHROMIUM	MG/L	<0.10	<0.010	<0.040
MERCURY	MG/L	<0.0002	<0.0002	<0.0002
LEAD	MG/L	0.008	<0.002	0.007
SELENIUM	MG/L	<0.05	<0.005	<0.05

AnalyticalTechnologies, Inc.

METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR

ATI I.D. : 106899

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER	MG/L	10690807	<0.010	<0.010	NA	0.096	0.100	96
SILVER	MG/L	10696901	<0.010	<0.010	NA	0.393	0.500	79
ARSENIC	MG/L	10693301	0.032	0.034	6	MSA	CC=	1.00
BARIUM	MG/L	10690807	0.039	0.038	3	0.139	0.100	100
BARIUM	MG/L	10697501	0.039	0.038	3	0.139	0.100	100
CADMIUM	MG/L	10690807	<0.005	<0.005	NA	0.102	0.100	102
CADMIUM	MG/L	10696901	<0.005	<0.005	NA	0.454	0.500	91
CHROMIUM	MG/L	10690501	1.16	1.16	0	2.10	1.00	94
CHROMIUM	MG/L	10696901	0.025	0.024	4	0.840	1.00	82
MERCURY	MG/L	10685401	<0.0002	<0.0002	NA	0.0051	0.0050	102
LEAD	MG/L	10767202	<0.002	<0.002	NA	0.046	0.050	92
SELENIUM	MG/L	10692830	<0.005	<0.005	NA	0.046	0.050	92

Acceptable.
JP
7/29/91

$$\%\ \text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10689901

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N11242, POND 1
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 06/25/91
DATE RECEIVED : 06/26/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/07/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<1
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<1
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE(TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

ROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	106

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10689902

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N11243, RAW WATER POND
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 06/25/91
DATE RECEIVED : 06/26/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/07/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<1
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<1
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE(TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	110

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10689903

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : N11244, SEEP POND
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 06/25/91
DATE RECEIVED : 06/26/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/07/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	0.67
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<1
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<1
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE(TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

ROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	119

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 106899
DATE EXTRACTED : 07/07/91
DATE ANALYZED : 07/07/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<1
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<1
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE(TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	100
BROMOFLUOROBENZENE (%)	108

Analytical**Technologies,** Inc.

QUALITY CONTROL DATA

ATI I.D. : 106899

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : SAN JUAN RVR
REF I.D. : 10799911

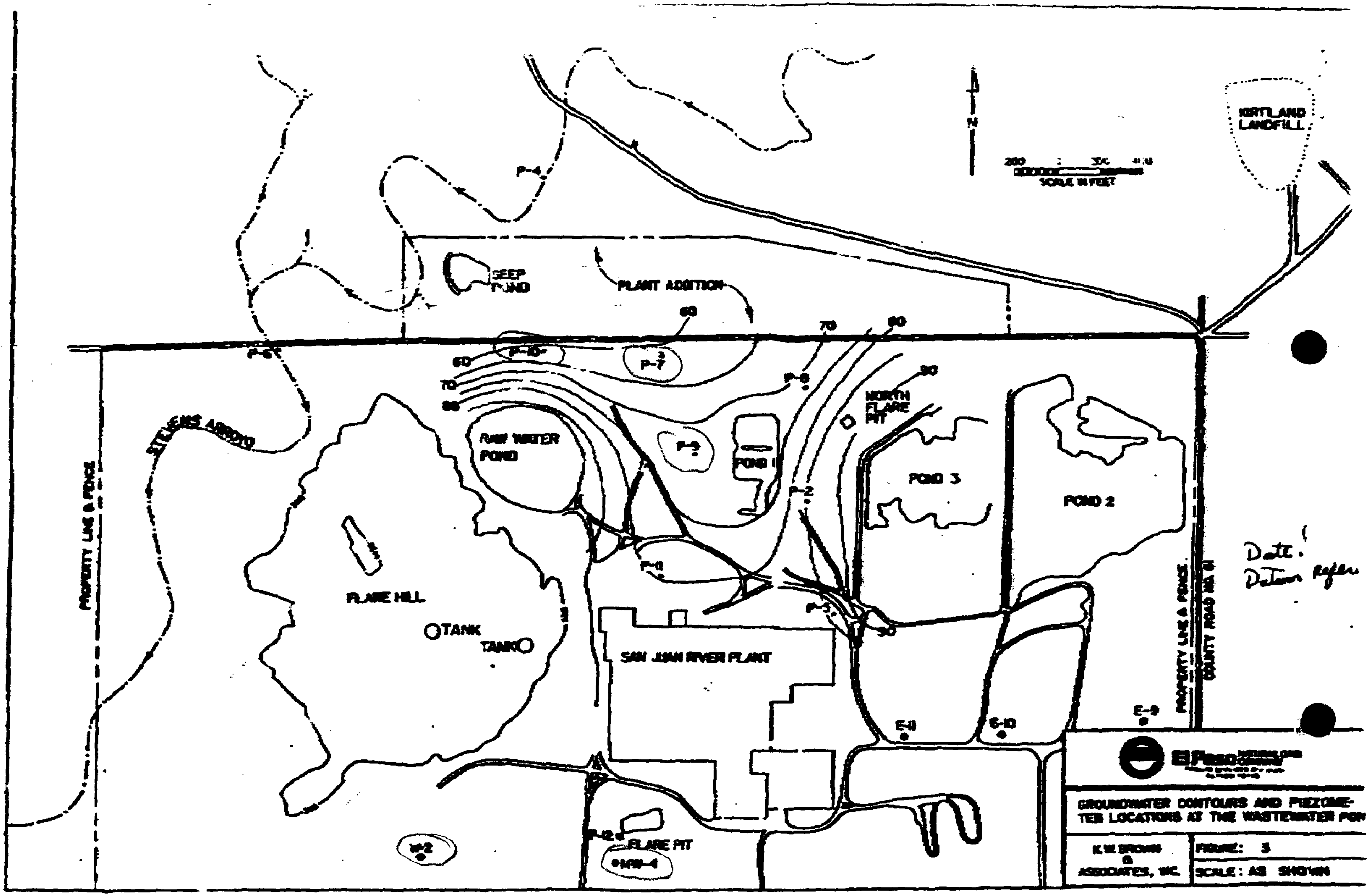
DATE ANALYZED : 07/07/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<0.20	4.00	3.4	85	3.4	85	0
TRICHLOROETHENE	<0.20	4.00	4.2	105	4.2	105	0
TETRACHLOROETHENE	<0.20	4.00	4.0	100	4.0	100	0
BENZENE	<0.50	4.00	3.8	95	3.6	90	5
BROMODICHLOROMETHANE	<0.20	4.00	4.1	102	4.1	102	0
CHLOROFORM	<0.20	4.00	3.6	90	3.6	90	0
1,1,1-TRICHLOROETHANE	<0.20	4.00	4.0	100	3.9	98	2
TOLUENE	<0.50	4.00	3.8	95	3.6	90	5
CHLOROBENZENE	<0.50	4.00	3.8	95	3.8	95	0
M-XYLENE	NA	NA	NA	NA	NA	NA	NA

Acceptable
J.S.
7/29/91

$$\%\text{ Recovery} = \frac{\text{(Spike Sample Result - Sample Result)}}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{\text{(Spiked Sample Result - Duplicate Spike Sample Result)}}{\text{Average of Spiked Sample}} \times 100$$



GROUNDWATER CONTOURS AND PIEZOMETER LOCATIONS AT THE WASTEWATER PON

K W BROWN
&
ASSOCIATES, INC.

FIGURE: 3

SCALE: AS SHOWN

Date!
Datum refer

FM-05-0336 (Rev. 11-84)

El Paso Natural Gas Company

ENGINEERING CALCULATION

PAGE 1 OF

PROJECT

DATE 6/25/91

SUBJECT MEETING WITH NMOCD

BY HENRY VAN

W.O.

- Participants
  - David Boyer - NMOCD
  - Bill Olsen - NMOCD
  - Tom Hutchins - EPNG
  - Anu Pundari - EPNG
  - Nancy Prince - EPNG
  - Henry Van - EPNG
- Place of Meeting: NMOCD Office, Sta. Fe.
- PURPOSE OF MEETING:
  1) Discuss Blanco Plant Groundwater Quality
  2) Discuss San Juan River Plant Wastewater Closure Plan

— DISCUSSIONS —

- SAN JUAN RIVER PLANT
  - Need to get approvals to conduct any more work from NMOCD
  - Raw Water Pond is being drained
  - Fig. 3
    ~~Needs~~ date of the work
    Mean or arbitrary data

Liquid gal/mole	MW		Gas ft.³/lb
6.4	16	C_1	23.65
10.12	30	C_2	12.62
10.42	44	C_3	8.606
12.38	58	iC_4	6.529
11.94	58	C_4	6.529
13.86	72	iC_5	5.26
13.71	72	C_5	5.26
15.59	86	iC_6	4.404
15.59	86	C_6	4.404
17.2	100	iC_7	3.787
17.49	100	C_7	3.787
19.38	114	C_8	3.322
8.50	28	C_2"	13.527
10.02	42	C_3"	9.018
6.456	44	CO_2	8.623
5.193	34	H_2S	11.136
4.151	28	N_2	13.547
3.399	2	H_2	188.2

14.7 psia
60° F

FM-05-0336 (Rev. 11-84)

El Paso Natural Gas Company

ENGINEERING CALCULATION

PAGE 2 OF

PROJECT

DATE 6/25/91

SUBJECT MEETING WITH NMOCD

BY Henry Van

W.O.

San Juan River Plant (Cont'd)

- page 11 Fig. 5
  Surface barrow soil areas
- page 12
  Need EM map of the KWBrown Survey. Maybe the data should be put in in the Fig. 6 p. 19
- page 14
  Elev. of H_2O @ 36 ft after the water mound is deleted.
- page 17
  May enhance evaporation of Pond 1.
- The lined pond may have a leak. Western Gas has detected wastewater in the wet well.
- May evaporate Pond 1 water by pumping to Pond 3 (spraying)
- Need to assess the impact of the South Flare Pit operation

* Need to Sample MW-4 first and after reviewing results a Groundwater study may be required.

- p. 23 provide the results for Table 3

Liquid gal/mole	MW		Gas ft.³/lb
6.4	16	C_1	23.65
10.12	30	C_2	12.62
10.42	44	C_3	8.606
12.38	58	iC_4	6.529
11.94	58	C_4	6.529
13.86	72	iC_5	5.26
13.71	72	C_5	5.26
15.59	86	iC_6	4.404
15.59	86	C_6	4.404
17.2	100	iC_7	3.787
17.49	100	C_7	3.787
19.38	114	C_8	3.322
8.50	28	C_2''	13.527
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14.7 psia
60° F

FM-05-0336 (Rev. 11-84)

El Paso Natural Gas Company

ENGINEERING CALCULATION

PAGE 3 OF

PROJECT

DATE 6/25/91

SUBJECT MEETING WITH NMOCD

BY

San Juan River Plant (Cont'd)

W.O.

- Need to Sample the Disch. Plans Monitoring Wells that had HC, on the North Side. (P-7, P-9, P-10) Develop (Purging) and resample.

- p. 23

  Need to Sample for G.W.
  Calcium
  NO_2 NO_3, HCO_3/CO
  TKN

- p. 24

  Where would the pump back H_2O will be disposed? It may be disposed in the lined pond or hauled. However, NMOCD needs to be notified.

- May need to prevent the seep pond from flowing into the Stevens Arroyo.

- p. 26

  Optional Remediation Efforts
  Not sure about the use of gypsum
  would the gypsum be a source of salts.
  Need to clarify the process of the gypsum

Liquid gal/mole	MW		Gas ft.³/lb
6.4	16	C_1	23.65
10.12	30	C_2	12.62
10.42	44	C_3	8.606
12.38	58	iC_4	6.529
11.94	58	C_4	6.529
13.86	72	iC_5	5.26
13.71	72	C_5	5.26
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14.7 psia
60° F

FM-05-0336 (Rev. 11-84)

El Paso Natural Gas Company

ENGINEERING CALCULATION

PAGE 4 OF

PROJECT

DATE 6/25/91

SUBJECT MEETING WITH NMOCD

BY Henry Van

San Juan River Plant (Cont'd)

W.O.

- p. 26

Closure of the N. Flare Pit
Should clarify that there are Pits
not just only the N.

- p. 27

Deletion of the gravel capillary barrier is OK.
Must have an inspector and engineer at the site to insure the borrowing of material and placement is done properly.

- p. 29

Placement plan for the material.
coarser material should be placed first. What effect does compaction have? Need to discuss with soil engineers.

- p. 28

No problem starting post closure monitoring before the G.W. level gets below 15 feet

Liquid gal/mole	MW		Gas ft.³/lb
6.4	16	C_1	23.65
10.12	30	C_2	12.62
10.42	44	C_3	8.606
12.38	58	iC_4	6.529
11.94	58	C_4	6.529
13.86	72	iC_5	5.26
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6.456	44	CO_2	8.623
5.193	34	H_2S	11.136
4.151	28	N_2	13.547
3.399	2	H_2	188.2

14.7 psia
60° F

OCD/EPNG Meeting 6/25/91 0930 hrs

participants

Dave Boyer } OCD
Bill Olson }
Henry Van }
Tom Hutchinson } EPNG
Anon Chandai }
Nancy Prince }

T.H. Would o like to get copy of EPA NPDES General Onshore Order

D.B. Get give you
Permit not to discharge except for wildlife, a.g. uses

D.B + WO Discuss filing D.P. NOI for all new compressor stations
existing compressor stations will be phased

DB What about Flora Vista

TH Some prob. with access with landowner
also not all equip in for field detectors
Expect to resolve in next few weeks

So far backgrd with field detector ≈ 40 ppm in soil

May take excavated soils to Envirotech

San Juan Rive Plant Final Closure Plan April 1991

D.B. Need to get approval from OCD prior to any major work

T.H. Will do

D.B. Appears to be good plan

T.H. Key item reducing elevated W.T.

D.B. Is low water pond in use

T.H. Pond down but need to get vacuum truck in to empty rest of pond

H.V. Know of any more work at Kirtland landfill

DB + W.O. BLM did initial invest. but only reccomended monitoring and no other work
OCD feels could be potential superfund site

* D.B. What is date of measurement of W.T. elevations.

H.V. Believe from last D.P. applic., 1985 ?
will get to OCD

D.B. Are all borrow sites on EPNG prop.

T.H. Yes with possible exception of borrow site #1
Would have to negotiate access if not EPNG prop.

* D.B. No, EM contour map provided
need to get one

T.H. Will ~~get~~ provide

D.B. Will Western Gas allow water disposal (refer to pg 17 - "lined pond used to evap. excess water")
in lined pond

T.H. Probs with laying lines
May want to ~~do~~ put in plant drain system or
spray on adjacent pond 2

D.B. - Be aware we believe may be leak in western lined pond. Western Gas has been notified
~~Also~~
- No solids samples from bottom of impoundments
also no G.W. samples

H.V. Well below South Flare pit P-12 was run over by dozer doesn't exist

T.H. Water in MW-4 appeared clean, no odor

D.B. Need to get water quality around south flare pit. Did have high nitrates in P-12, sickly odor
G.W. in this area is high priority, may need G.W. invest. in this area based on results in near-by wells
Taken G.W. samples for report

T.H. No do you want

D.B. Yes, for south flare area especially but not for land application area
~~What about~~
Sample - north plant wells that previously showed hydrocarbons
- south flare pit area wells that previously shown H.C. or nitrates

Some Gen chem (anions/cations) missing,
- Ca^{+2}
- HCO_3^-
- total K - $NO_3^=$

T.H. Will do

D.B. Pg 24 where will pump back fluids go

T.H. Either haul off or to lined pond

D.B. -Need to notify OCD of disposal location

-Also want to close pump back pond as landfill
Should keep for containment of salts also
could be used to control runoff from facility

T.H. Will look into

D.B. Pg. 26. Optional Remed Efforts
where would excavated impoundment bottom be
excavated to

Excavated salts, push back over as cover

D.B. Purpose of gypsum

T.H Idea is gyp would impede vertical migration
capillary barrier

But wouldn't it also have potential to add salts
Don't understand

T.H. Don't want to use but will clarify

W.D. pg 26 South flare pit not addressed

T.H. Will clarify it applies to both north & south

D.B. -Need to see results of sludge testing before decision of closure can be reached

- Will EPNG have person on site to ensure quality of borrow material

T.H. Will have inspector, engineer onsite to verify borrow quality

D.B. 18" cover in both drainages & impoundments, will lifts be compacted

T.H. Scraper applied then allows for heavy equipment compaction

D.B. If have more compaction in bottom coarse layer won't you lose some of effect of capillary barrier
ie. will you have same capillary barrier effect when compacted if not may need use other material (ie gravel)

Will talk to KW Brown to see if compaction was considered in capillary barrier

T.H. KW Brown reccomended 15' drop in W.T. for effectiveness. does need to be below this level ~~to~~ to begin work

D.B. As long as source of head removed (ponds) prior to work OCD believes should go ahead with work

T.H. Can send OCD letter supplying info on issues discussed above, to expedite paperwork

Blanco ~~B~~ Plant Invest. (Nov. 1990)

T.H. Handed out new info on MW's.
Found product in 4 of wells
- W-18
- W-19
- W-6

D.B. ~~Need to~~ Are still pumping collector pump near plant D

T.H. Yes

D.B. Collector well has product?

El Paso
Natural Gas Company

P. O. BOX 1492
EL PASO, TEXAS 79978
PHONE: 915-541-2600

OIL CONSERVATION DIVISION
RECEIVED
'91 MAY 6 AM 9 24

May 2, 1991

David G. Boyer, Hydrogeologist
Environmental Bureau Chief
Oil Conservation Division
Energy, Minerals & Natural Resources Dept.
State of New Mexico
Post Office Box 2088
State Land Office Bldg.
Santa Fe, New Mexico 87504

Re: San Juan River Plant Pond Closure Plan

Dear Mr. Boyer:

Enclosed please find two copies of our plan for closure of the flare pits and wastewater impoundments at San Juan River Plant in portions of Section 1, T-29-N, R-15-W and Section 36, T-30-N, R-15-W, San Juan County, New Mexico.

As you know, this is the culmination of a long series of studies. The objective has evolved from discharge of wastewater to the development of a method of closure to prevent leached salts from entering the San Juan River watershed. We believe the extent of these previous investigations have provided us with much more information than would ordinarily have been the case. We have been able to draw upon that knowledge to put together a plan that is exceptionally well-founded.

We have endeavored to include as much pertinent data as necessary in the closure plan to explain and justify the measures proposed. In order to expedite the process, we have been monitoring groundwater levels since last fall and have conducted sludge and soil sampling in accordance with the guidelines presented in the plan. We have scheduled further geotechnical testing and other measures aimed at implementing the plan as soon as possible. We hope to complete the soil work associated with the closure by the end of the summer.

If you have any questions or would like to schedule a meeting to discuss this plan, please call me any time at (915) 541-3531. Please be assured that we have every intention of continuing our long record of cooperation with the Division to achieve our mutual goals.

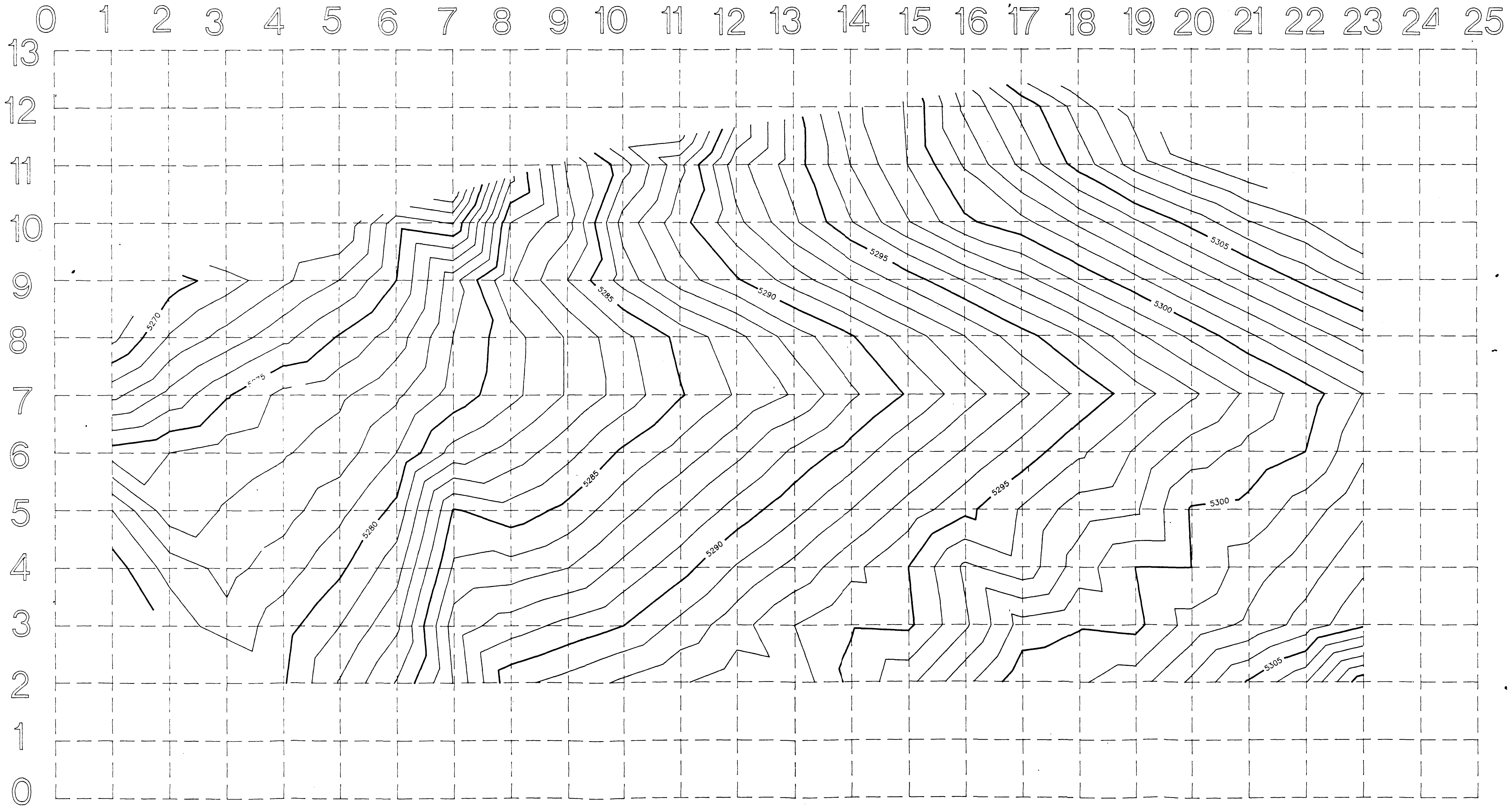
Sincerely,

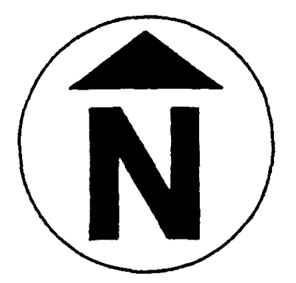
Thomas D. Hutchins
Thomas D. Hutchins, Manager
North Region Compliance Engineering

SAN JUAN PLANT POND CLOSURE

TOPOGRAPHY OF ORIGINAL GRADING PLAN

JANUARY 23, 1996



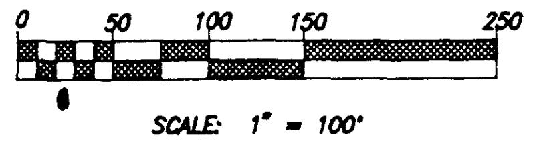


PROJECT
NORTH

BENCHMARK

ORIGINAL BENCHMARK 80d SPIKE
FLUSH WITH GROUND MARKED IN
FIELD AS ELEVATION 5294.35 (BY OTHERS)

NEW BENCHMARK 60d SPIKE IN POWER
POLE ELEVATION 5296.58, TRANSFERED
FROM ORIGNINAL BENCHMARK AND VERIFIED

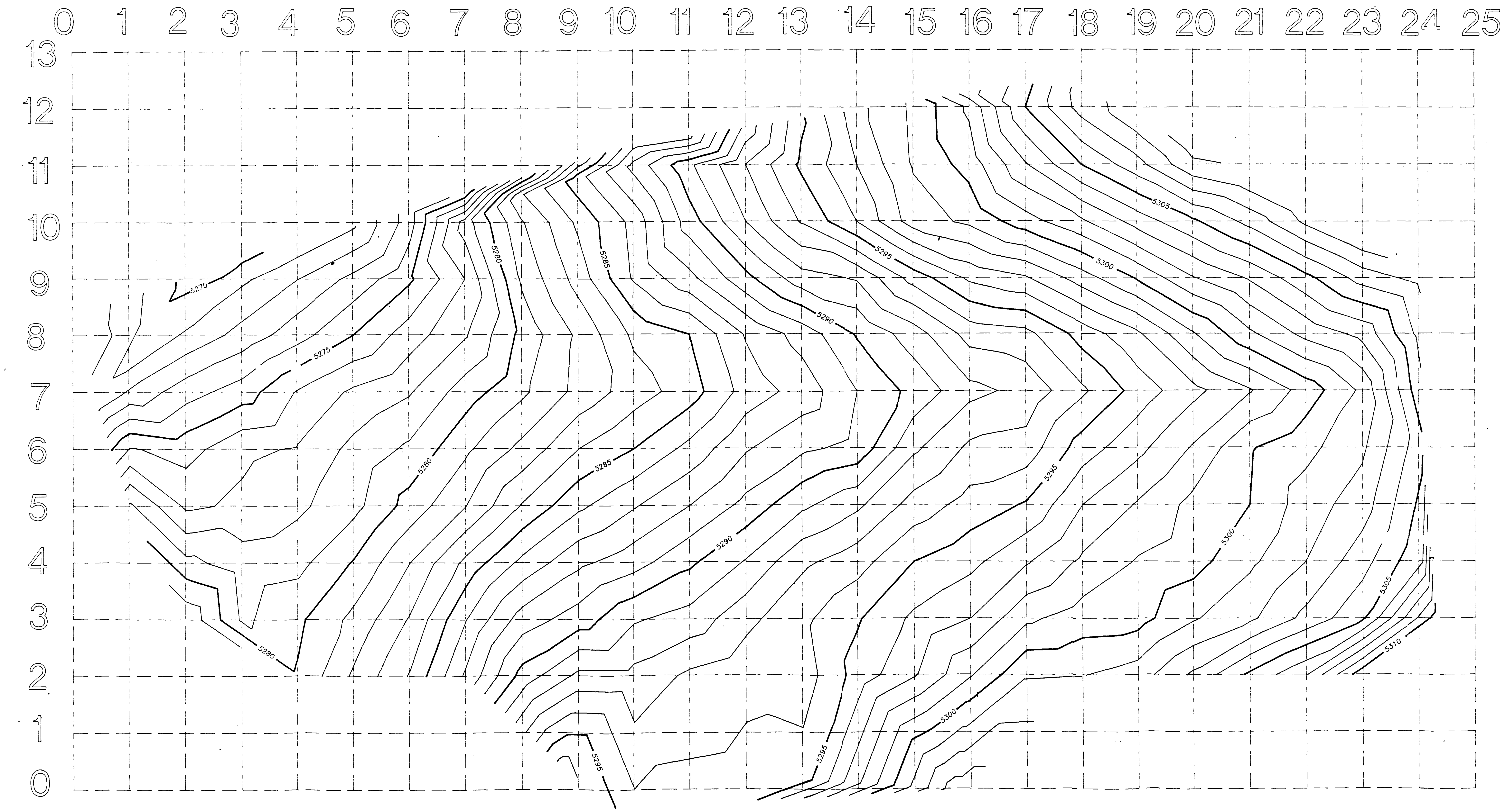


SCALE: 1" = 100'

SAN JUAN PLANT POND CLOSURE

ASBUILT TOPOGRAPHY

JANUARY 23, 1996



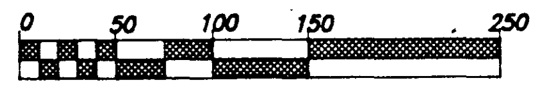
N

PROJECT
NORTH

BENCHMARK

ORIGINAL BENCHMARK 80d SPIKE
FLUSH WITH GROUND MARKED IN
FIELD AS ELEVATION 5294.35 (BY OTHERS)

NEW BENCHMARK 60d SPIKE IN POWER
POLE ELEVATION 5296.58, TRANSFERED
FROM ORIGNINAL BENCHMARK AND VERIFIED



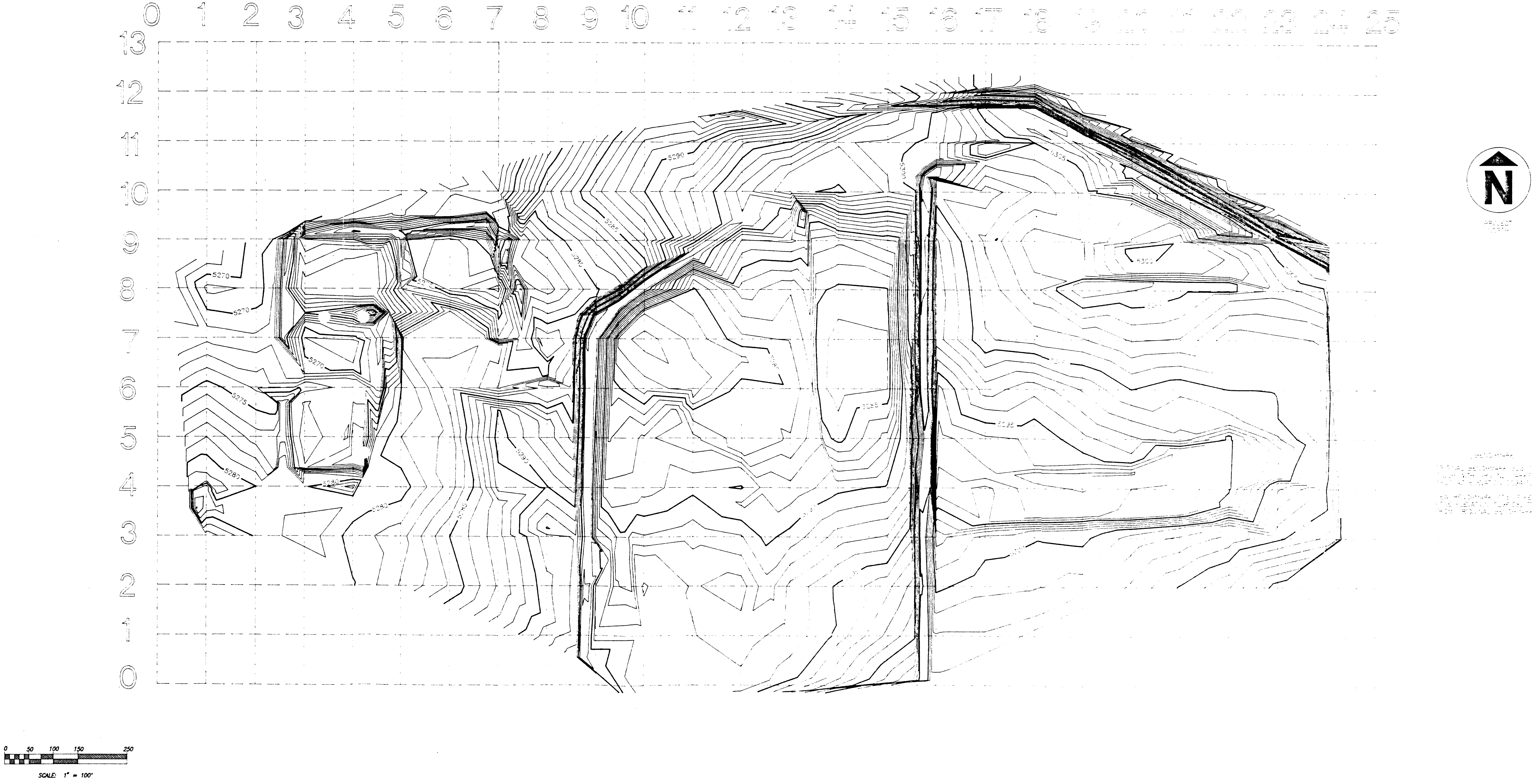
SCALE: 1" = 100'

RECEIVED
FEB 14 1996
Environmental Bureau
Oil Conservation Division

SAN JUAN PLANT POND CLOSURE

ORIGINAL TOPOGRAPHY

JANUARY 23, 1996



RECEIVED
FEB 14 1996
Environmental Bureau
Oil Conservation Division

754
3

STATE OF NEW MEXICO
ENVIRONMENT

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

[redacted]

REPORT TO: DAVID G. BOYER
PLEASE PRINT
NEW MEXICO OIL CONSERVATION DIV.
P.O. BOX 2088
SANTA FE, NM 87504-2088

S.L.D. No.: OR- 586-A-B
DATE REC. : 5/22/86
SLD PRIORITY #: ______

PHONE(S): 827-5812

USER CODE: |8|2|2|3|5|

SUBMITTER: DAVID BOYER

SUBMITTER CODE: |_|_|_|_|_|

SAMPLE TYPE: WATER ☒, SOIL ☐, OTHER ______

SAMPLE TYPE CODE: |_|_|

COLLECTED: 5/20/86 - 16:15 BY AB
DATE TIME INITIALS

CODE: |8|6|0|5|2|0|1|6|1|5|AB| |
Y Y M M D D H H M M I I I

SOURCE: P12

CODE: |_|_|_+_|_|_|_+_|_|_|_|_|
AQUIFER DEPTH

NEAREST CITY: KIRTLAND

CODE: |_|_|_|_|_|_|

LOCATION: EP SAN JUAN PLANT

CODE: |2|9|N|1|5|W|2|1|_|_|_|
TOWNSHIP RANGE SECTION TRACTS

pH= 7.5 ; Conductivity= 4820 umho/cm at 21 °C; Chlorine Residual= ______

Dissolved Oxygen= ______ mg/l; Alkalinity= ______ ; Flow Rate= ______

Sampling Location, Methods and Remarks (i.e. odors, etc.)

HEAVY HC/AMINE ODOR; GREEN IRIDESCENT COLOR
BAILED 5 TIMES
S of PROCESS PLANT WSW of FLARE PIT

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Jami Baile

Method of shipment to the Laboratory Hand carried

This form accompanies 2 Septum Vials, ___ Glass Jugs, ___ ______

Containers are marked as follows to indicate preservation:

☐ NP: No preservation; sample stored at room temperature.
☒ P-Ice Sample stored in an ice bath (not frozen).
☐ P-$Na_2S_2O_3$: Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from ______
to ______ at (location) ______ on
___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME
Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐
Signatures ______ ______

(we) certify that this sample was transferred from ______
to ______ at (location) ______ on
___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME
Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐
Signatures ______ ______

ANALYSES REQUESTED **LAB. No.: ORG-** 586

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
X	X	HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
aromatic purgeables ⊗	none detected		
halogenated purgables	none detected		
		* DETECTION LIMIT	5 ppb

REMARKS: Six compounds were detected by the aromatic screen that were not identified. ⊗ There is a possible trace of benzene < 1 ppb.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO X. Seal(s) broken by:________ date:______

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 6 Jun 86. Analyst's signature: J Tinney

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyerhen

FOR OCD USE -- Date Owner Notified______ Phone or letter?______ Initials______

764
3

86-0601-B

ENVIRONMENT

STATE OF NEW MEXICO

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud NE
Albuquerque, NM 87106 841-2570

REPORT TO: DAVID G. BOYER
PLEASE PRINT
NEW MEXICO OIL CONSERVATION DIV.
P.O. BOX 2088
SANTA FE, NM 87504-2088

S.L.D. No.: OR- 601-H
DATE REC. : 5/22/86
SLD PRIORITY #: ______

PHONE(S): 827-5812

USER CODE: 8|2|2|3|5

SUBMITTER: DG BOYER

SUBMITTER CODE: |_|_|_|_|

SAMPLE TYPE: WATER ☒, SOIL ☐, OTHER ______

SAMPLE TYPE CODE: |_|_|

COLLECTED: 86/05/20 - ~~15~~ 16 : ~~40~~ 45 BY DGB
DATE TIME INITIALS

CODE: 8|6|0|5|2|0|1|6|1|5|D|G|B
Y Y M M D D H H M M I I I

SOURCE: ~~Well #4~~ P12

CODE: |_|_|_|_|_|_|_|_|_|_|_|_|
AQUIFER DEPTH

NEAREST CITY: ~~Flora Vista~~ EP SAN JUAN

CODE: |_|_|_|_|_|_|_|

LOCATION: KIRTLAND

CODE: 29 N 15 W 01 ~~3|0|N|1|2|W|2|3|3|3|2~~
TOWNSHIP RANGE SECTION TRACTS

pH=______; Conductivity=______umho/cm at ______°C; Chlorine Residual=______

Dissolved Oxygen=______mg/l; Alkalinity=__________; Flow Rate=__________

Sampling Location, Methods and Remarks (i.e. odors, etc.)

IRIDESCENT GREEN COLOR, HC/AMINE ODOR

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. David G Boyer

Method of shipment to the Laboratory Hand carried

This form accompanies ___ Septum Vials, 1 Glass Jugs, ____ ________

Containers are marked as follows to indicate preservation:

- ☐ NP: No preservation; sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (not frozen).
- ☐ P-$Na_2S_2O_3$: Sample preserved with $Na_2S_2O_3$ to remove chlorine residual.

I (we) certify that this sample was transferred from DG Boyer
to ______________ at (location) SLD on
___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME
Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐
Signatures ______________ DG Boyer

(we) certify that this sample was transferred from ______________
to ______________ at (location) ______________ on
___/___/___-___:___ and that the statements in this block are correct.
DATE AND TIME
Evidentiary Seals: Not Sealed ☐ Seals Intact: Yes ☐ No ☐
Signatures ______________ ______________

ANALYSES REQUESTED LAB. No.: ORG- 601

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
		AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
			☒	☒	POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS
					Napthalenes, Benzoapyrene

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
NAPHTHALENE	< 5ppB		
2-METHYLNAPHTHALENE	< 5ppB		
1-METHYLNAPHTHALENE	<5 ~~5 ppm~~ ppB		
Benzo(a) Pyrene	< 5ppB		
		* DETECTION LIMIT	

REMARKS:

unlisted PNA's < 5ppm except Dibenzo(a,h)anthracene which is < 10 ppB

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes___ NO___. Seal(s) broken by:____________ date:________

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 7/9/86. Analyst's signature:

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature:

FOR OCD USE -- Date Owner Notified________ Phone or letter?________ Initials________

2
859

New Mexico Health and [illegible] ment Department
SCIENTIFIC LABORATO[illegible] DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

[illegible]NERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 5 | 22 | 86
LAB NO. WC 2225
USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235

Collection DATE 5 | 20 | 86
Collection TIME 1615
WC 2226 SITE INFORMATION ►
Sample location P12
Collection site description EP - SAN JUAN PLANT
Sec 1 T29N R15W
Collected by — Person/Agency BOYER /OCD

SEND FINAL REPORT TO ►
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87504-2088
Attn: David Boyer
Phone: 827-5812

Station/well code
Owner

SAMPLING CONDITIONS

☒ Bailed ☐ Pump
☐ Dipped ☐ Tap
Water level CSG 1.6' G.L. 22' TOC
Discharge
Sample type
pH (00400) 7.5
Conductivity (Uncorrected) 4820 µmho
Water Temp. (00010) 21 °C
Conductivity at 25°C (00094) µmho
Field comments HEAVY HC/AMINE ODOR - GREEN IRIDESCENT COLOR
BAILED 5 TIMES

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted 1
☐ NF: Whole sample (Non-filtered)
☒ F: Filtered in field with 0.45 µmembrane filter
☐ A: 2 ml H_2SO_4/L added
☒ NA: No acid added
☐ Other-*specify*:
☐ A: 5ml conc. HNO_3 added
☐ A: 4ml fuming HNO_3 added

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	252	mg/l	6-2
☒ Magnesium (00925)	322	mg/l	"
☒ Sodium (00930)	726.8	mg/l	"
☒ Potassium (00935)	17.2	mg/l	"
☒ Bicarbonate (00440)	3322	mg/l	5/26
☒ Chloride (00940)	218	mg/l	6/5
☒ Sulfate (00945)	742	mg/l	6/2
☒ Total filterable residue (dissolved) (70300)	5210	mg/l	5/28
☒ Other: CO_3	0		5/26

NF, A-H_2SO_4		Units	
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l
☐ Ammonia-N dissolved (00608)		mg/l
☐ Total Kjeldahl-N ( )		mg/l
☐ Other:		

Analyst
Date Reported 6 | 11 | 86
Reviewed by

Laboratory remarks

SLD 726 (12/84)

93

FOR OCD USE -- Date Owner Notified________ Phone or letter?________ Initials________

New Mexico Health and [illegible]nment Department
SCIENTIFIC LABORAT[illegible] DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

852

[illegible]NERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 5 | 22 | 86
LAB NO. 2233
USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235

Collection DATE 5 | 20 | 86
Collection TIME 1615
Collected by — Person/Agency BOYER/OCD

SITE INFORMATION ►
Sample location P 12
Collection site description EP SAN JUAN PLANT

SEND FINAL REPORT TO ►
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87504-2088
Attn: David Boyer
Phone: 827-5812

RECEIVED
JUL
OIL CONSERVATION DIVISION
SANTA FE

Station/ well code
Owner

SAMPLING CONDITIONS

☒ Bailed ☐ Pump ☐ Dipped ☐ Tap	Water level CSG 1.6' G.L. 22' TOC	Discharge	Sample type
pH (00400) 7.5	Conductivity (Uncorrected) 4820 µmho	Water Temp. (00010) 21 °C	Conductivity at 25 °C (00094) µmho

Field comments HEAVY HC/AMINE ODOR - GREEN IRIDESCENT COLOR
BAILED 5 TIMES

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted 1
☐ NF: Whole sample (Non-filtered)
☒ F: Filtered in field with 0.45 µmembrane filter
☒ A: 2 ml H_2SO_4/L added
☐ NA: No acid added
☐ Other-*specify:*
☐ A: 5ml conc. HNO_3 added
☐ A: 4ml fuming HNO_3 added

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☐ Conductivity (Corrected) 25 °C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☐ Calcium (00915)		mg/l	
☐ Magnesium (00925)		mg/l	
☐ Sodium (00930)		mg/l	
☐ Potassium (00935)		mg/l	
☐ Bicarbonate (00440)		mg/l	
☐ Chloride (00940)		mg/l	
☐ Sulfate (00945)		mg/l	
☐ Total filterable residue (dissolved) (70300)		mg/l	
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☒ Nitrate-N +, Nitrate-N dissolved (00631)	<0.04	mg/l	6/2
☒ Ammonia-N dissolved (00608)	449	mg/l	6-29
☒ Total Kjeldahl-N ( )	1400	mg/l	6-10
☐ Other:			

Analyst
Date Reported 7 | 7 | 86
Reviewed by

Laboratory remarks

SLD 726 (12/84)

FOR OCD USE -- Date Owner Notified ________ Phone or letter? ________ Initials ________

New Mexico Health and [illegible]ment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

HEAVY METALS

~~GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS~~

DATE RECEIVED 5 22 86
LAB NO. HM-996
USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235
Collection DATE 5 20 86
Collection TIME 1615
Collected by — Person/Agency BOYER/OCD

SITE INFORMATION ►
Sample location P12
Collection site description EP SAN JUAN PLANT
Sec 1 T29N R15W
Station/well code
Owner

SEND FINAL REPORT TO ►
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87504-2088
Attn: David Boyer
Phone: 827-5812

SAMPLING CONDITIONS

☒ Bailed ☐ Pump
☐ Dipped ☐ Tap
Water level 2S6 1.6 G.L 22' TOC
Discharge
Sample type
pH (00400) 7.5
Conductivity (Uncorrected) 4820 µmho
Water Temp. (00010) 21 °C
Conductivity at 25°C (00094) µmho
Field comments HEAVY HC/AMINE ODOR - GREEN IRIDESCENT COLOR BAILED 5 TIMES

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted 1
☐ NF: Whole sample (Non-filtered)
☒ F: Filtered in field with 0.45 µmembrane filter
☐ A: 2 ml H_2SO_4/L added
☐ NA: No acid added
☐ Other-specify:
☐ A: 5ml conc. HNO_3 added
☒ A: 4ml fuming HNO_3 added

ANALYTICAL RESULTS from SAMPLES

~~NF, NA~~ F, A		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☒ Other: ICAP SCAN			
☒ Other: As			
☒ Other: Se			
☒ Hg			

F, NA		Units	Date analyzed
☐ Calcium (00915)		mg/l	
☐ Magnesium (00925)		mg/l	
☐ Sodium (00930)		mg/l	
☐ Potassium (00935)		mg/l	
☐ Bicarbonate (00440)		mg/l	
☐ Chloride (00940)		mg/l	
☐ Sulfate (00945)		mg/l	
☐ Total filterable residue (dissolved) (70300)		mg/l	
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst
Date Reported 7 23 86
Reviewed by Jim Ashby

Laboratory remarks Digested

SLD 726 (12/84)

FOR OCD USE -- Date Owner Notified________ Phone or letter?________ Initials________

Lab Number: ITM 996

Date Submitted: 5/22/86

By: Boyer

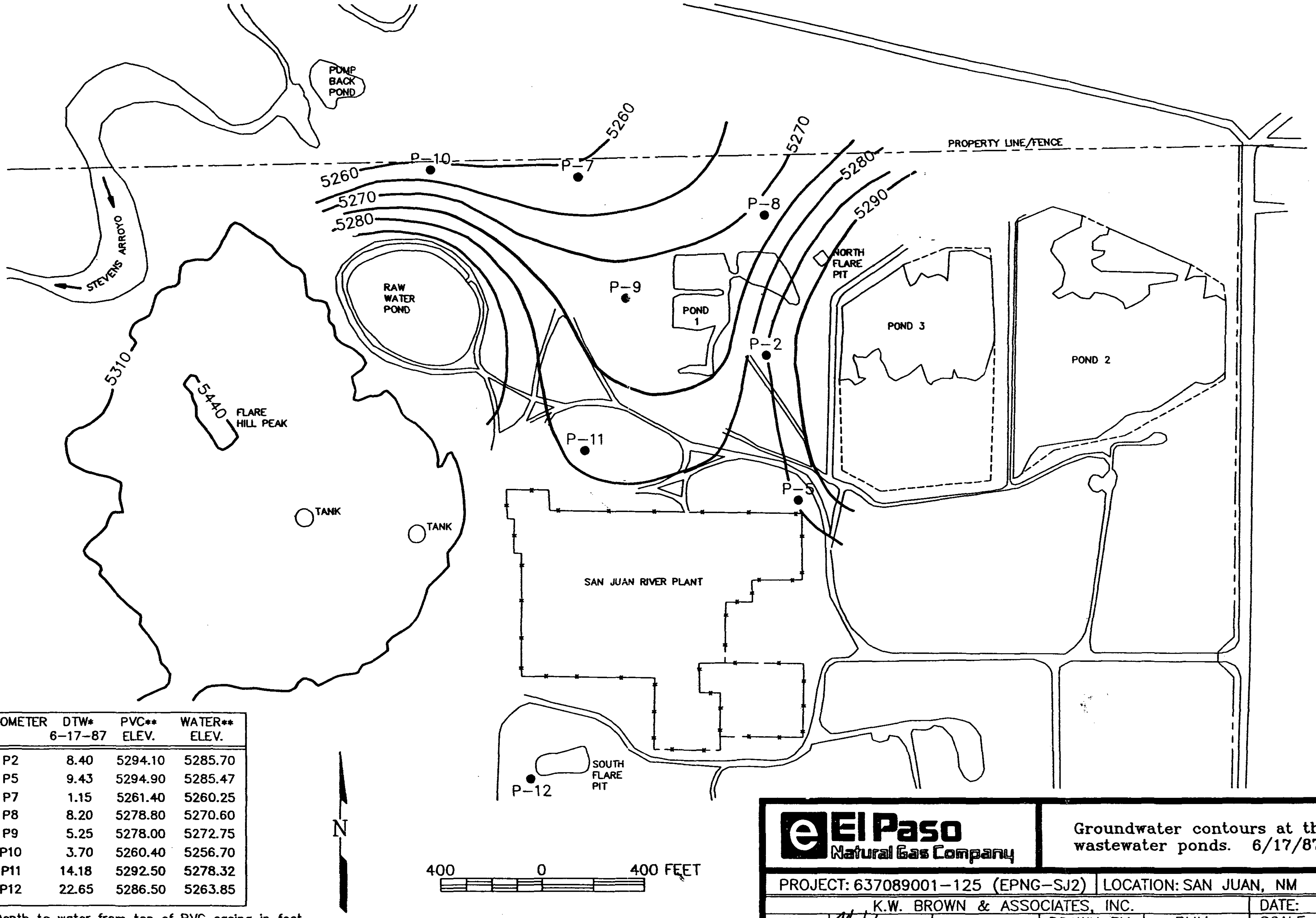
Sample [illegible]de: P12 EP San Juan Plant

Date Analyzed: 5/27/86

Reviewed By: Jim [illegible]

Date Reported: 7/23/86

Element	ICAP VALUE(MG/L)	AA VALUE(MG/L)
Aluminum	<0.1	
Barium	0.1	
Berylium	<0.1	
Boron	0.9	
Cadmium	<0.1	
Calcium	130.	
Chromium	<0.1	
Cobalt	<0.1	
Copper	<0.1	
Iron	3.2	
Lead	<0.1	
Magnesium	170.	
Manganese	0.7	
Molybdenum	<0.1	
Nickel	0.2	
Silicon	4.7	
Silver	<0.1	
Strontium	6.5	
Tin	<0.1	
Vanadium	<0.1	
Zinc	<0.1	
Arsenic		0.035
Selenium		<0.01
Mercury		<0.0005



PIEZOMETER	DTW* 6-17-87	PVC** ELEV.	WATER** ELEV.
P2	8.40	5294.10	5285.70
P5	9.43	5294.90	5285.47
P7	1.15	5261.40	5260.25
P8	8.20	5278.80	5270.60
P9	5.25	5278.00	5272.75
P10	3.70	5260.40	5256.70
P11	14.18	5292.50	5278.32
P12	22.65	5286.50	5263.85

* Depth to water from top of PVC casing in feet.
** Elevations in feet above mean sea level.

El Paso Natural Gas Company

Groundwater contours at the wastewater ponds. 6/17/87

PROJECT: 637089001-125 (EPNG-SJ2) | LOCATION: SAN JUAN, NM

K.W. BROWN & ASSOCIATES, INC.

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GW 039

SUMMARY OF INVESTIGATIONS AT THE SAN JUAN RIVER PLANT KIRTLAND, NEW MEXICO

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EXECUTIVE SUMMARY

This report serves to summarize environmental work completed by El Paso Natural Gas Company (EPNG) at the San Juan River Gas Plant (the plant) located in San Juan County, New Mexico. The San Juan River Plant is a natural gas processing plant that was sold to Western Gas Processors, Ltd. by EPNG. Environmental work completed by EPNG has focused on the closure of three waste water evaporation ponds, two raw water makeup ponds, and the closure of two flare pits. Previous to the pond closure EPNG studied the feasibility of land application of waste water to eliminate pond usage. This effort resulted in the installation of groundwater monitoring wells where dissolved phase hydrocarbons and other inorganic chemicals of concern were identified in groundwater. In pursuing the discovery of hydrocarbons and inorganics in groundwater, EPNG installed additional monitoring wells, abandoned unnecessary ones, completed soil gas investigations, and completed quarterly groundwater sampling and reporting.

To date, studies do not indicate pervasive impact of the vadose zone at the Plant.

Based on previous investigations, the concentrations of inorganic chemicals in groundwater appear to be the result of plant activities; though the naturally occurring concentrations in the groundwater surrounding the plant are above relevant standards. The hydrocarbon impact to groundwater is localized and does not appear to be migrating. Due to natural attenuation, nutrient and oxygenate addition to enhance bioremediation and groundwater monitoring is recommended.

1.0 INTRODUCTION

The San Juan River Plant (the plant) is located in Section 1, Township 29 North, Range 15 West, San Juan County New Mexico (Figure 1). The site associated with the plant is approximately 630 acres. The plant and surrounding area contain the following items:

- A gas processing plant
- Two raw water ponds (now closed)
- Three wastewater evaporation ponds (now closed)
- Two flare pits (now closed)
- A sulfur recovery plant
- Various hydrocarbon and water tanks
- Pigging stations for line cleaning
- Various 16- to 24-inch diameter natural gas pipelines entering and leaving the plant.

The plant was previously owned by El Paso Natural Gas Company (EPNG) and is currently owned by Western Gas Processors, Ltd. EPNG installed 21 monitoring wells at the plant between 1985 and 1995. EPNG's purpose for installation of the wells was to identify any impacts to the environment that may have been the result of plant activities, and to evaluate groundwater quality and characteristics at the plant. This report includes a brief summary of the previous investigations at the facility, and details of the latest investigation by EPNG, including monitoring well installation and abandonment, groundwater sampling, and a soil-gas survey.

This report serves to summarize previous activities at the plant and to draw together all of the information collected to interpret current conditions at the plant. Sections 2 and 3 of the report summarize previous studies and remedial activities at the plant, then briefly discusses the work completed at the plant in 1995. Regional and site geology and hydrology are discussed in Sections 4 and 5, using all available information from published sources and past investigations. Section 6 details the results of contaminant investigations in the plant and conclusions are drawn regarding the source and extent of contaminants at the areas of the plant that were investigated. Section 7 gives brief recommendations for future action at the plant.

2.0 PREVIOUS STUDIES AND REMEDIAL ACTIVITIES

A number of studies were conducted at the plant from 1985 to 1995. A brief chronology of the work completed is presented in Table 1. Relevant studies are summarized below.

In 1985, Geoscience Consultants, Ltd. (GCL) conducted an investigation prior to a discharge plan submittal. GCL identified petroleum hydrocarbon-impacted groundwater in two of nine piezometers installed during the investigation. In two other wells installed during the investigation a "petroliferous odor" was described, but sample results were not reported.

KWB&A and Associates (KWB&A) conducted a study in 1987 (KWB&A 1987a) to support the land treatment and disposal of approximately 9.67 million gallons of non-contact wastewater produced annually at the plant. This report focused primarily on the potential effect of land treatment and disposal of wastewater on the soil and groundwater at the plant. Extensive evaluation of local soil and groundwater was completed. Site-specific geology, hydrology, and groundwater quality were also described.

KWB&A also installed three monitoring wells and three piezometers in 1987 to further evaluate groundwater quality and groundwater flow in the land application areas, as well as the feasibility of land application of discharge water from the plant (KWB&A 1987b). Piezometers installed during the Phase II investigation indicated the wastewater ponds appeared to be leaking and were considered the source of groundwater for the east portion of the plant; this may have influenced local groundwater flow characteristics.

In 1992, the south and north flare pits were closed and Closure Summaries were submitted to the New Mexico Oil Conservation Division (NMOCD) on February 8, 1993. These reports detailed remediation efforts removing hydrocarbon-contaminated soil from the old flare pit locations. Remediation of the south flare pit began on September 28, 1992, and a total of 18,200 cubic yards of contaminated material were removed from the pit. MW-4, which was 200 feet south of the south flare pit, did not show hydrocarbon contamination in groundwater samples collected in December of 1992.

Remediation activities at the north flare pit began on October 29, 1992. Approximately 3,520 cubic yards of contaminated soil were removed from the pit. Sampling of monitoring well P-8, located 100 feet down gradient of the north flare pit, indicated no benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations. The soil excavated from the flare pits has been landfarmed at the site, as shown on Figure 2.

Details of the flare pit closures are outlined in EPNG's September 16, 1992, report.

EPNG produced two soil sampling and analysis reports, dated August 3, 1995, and August 22, 1995. These two reports documented the sampling of the soils in the former ponds at the plant. Soil samples collected in this sampling event were analyzed for common cations and anions, total petroleum hydrocarbons (TPH), and BTEX.

EPNG closed the former wastewater evaporation ponds in late 1995, and early 1996. Pit and pond closure activities resulted in capping the ponds with low permeability, compacted soil. The activities were summarized in a letter report to the NMOCD, dated November 26, 1996.

3.0 1995 INVESTIGATION

The most recent investigation at the San Juan River Plant, was completed in the summer of 1995. Additional sampling of ground water monitor wells MW-5, MW-8, and MW-9 has; however, occurred since 1995. During the 1995 phase of work, Philip Environmental Services Corporation (Philip) abandoned 17 wells, upgraded 2 wells, and installed 5 new monitoring wells. The abandoned wells had been installed between 1985 and 1987 to aid in the characterization of potential contaminant migration and to support the installation of the landfarm. EPNG chose to abandon these wells because they were no longer required, or they were found to be unusable. Three of the five new wells were installed to replace three of the abandoned wells in areas where EPNG wished to continue monitoring groundwater impacts. The abandoned wells were replaced because they did not have accurate well construction data to allow them to be useful. Table 2 summarizes the work completed in this phase of work. Philip's 1995 report, "Monitoring Well Installation, Upgrade and Abandonment" and Philip's August 1995 report, "Soil Gas and Soil Survey" presents the results of this work. The soil and soil-gas investigation was also conducted in 1995 using Philip's RECON® van. Soil and soil-gas samples were collected from areas adjacent to three wells that EPNG had identified as areas of concern.

3.1 MONITORING WELL ABANDONMENT

The existing monitoring wells were abandoned by first trying to pull the casing with a drilling rig. If the casing could not be removed, Philip utilized drill rig equipment with a case-cutting tool to rip the casing from surface to bottom. The final step was to seal the open hole or ripped casing with grout, using a tremie cementing method. Abandoned wells are shown on Figure 2.

3.2 MONITORING WELL INSTALLATION

The monitoring well portion of this phase of work included the installation of four wells, MW-6, MW-7, MW-8, and MW-9. These wells were installed in the vicinity of existing wells which were abandoned as part of this project. A fifth well, MW-5, was installed down-gradient of MW-8 and MW-9. The purpose of the well installations was to further assess the groundwater quality in the area of known impact and to document up-gradient and down-gradient water quality.

3.3 MONITORING WELL UPGRADE

Two of the existing monitoring wells, W-2 and MW-4, were upgraded by placing a locking protective casing cover over the existing polyvinyl chloride (PVC) casing and setting a concrete pad to support the protective casing. Upgraded well locations are shown in Figure 2.

3.4 RECON® INVESTIGATION

On June 28, 1995, EPNG conducted a soil and soil-gas investigation around three wells at the plant. The groundwater samples from these wells had historically elevated levels of BTEX. The purpose of the investigation was to attempt to gather data with respect to the horizontal and vertical extent of BTEX contamination around each well.

The three wells investigated included P-7, P-10, and P-11. Probe holes were initiated radially around each well location and soil-gas samples were taken at various depths until non-detect samples were obtained. Once the vertical extent of contamination was determined in a probe hole, step-out probe holes were initiated at approximately 20-foot intervals, until non-detect samples were observed horizontally. Each soil or soil-gas sample was analyzed on-site by United States Environmental Protection Agency (USEPA) SW-846 Method 3810 Static Headspace Extraction Procedure, and USEPA Method 8020 Aromatic Volatile Organics Analysis. Figures 3, 4, and 5 show the location of the probe holes around the investigated wells.

4.0 REGIONAL AND SITE GEOLOGY

4.1 REGIONAL GEOLOGY

The plant is located in the northeastern portion of the San Juan Basin. The San Juan Basin is a structural basin, formed of a thick sequence of sedimentary rocks, which underlies the north-western corner of New Mexico. Formation of the basin began in the late Cretaceous Period and continued into the Tertiary Period. During the late Cretaceous Period, sediments were deposited in a shallow sea which was vacillating between transgressive and regressive sequences. This resulted in the deposition of both marine and non-marine sediments. Cretaceous and Tertiary sediments in the basin usually dip gently toward the center of the basin. (Stone et al 1983).

The primary geologic formations in the area of the plant are considered to be the Kirtland Shale and alluvial sediments. The Kirtland shale and the underlying Fruitland formation are often lumped together in mapping and have similar hydrologic properties (Stone et al 1983). The Kirtland shale is a late Cretaceous marine deposit which was divided into three members by Bauer (1916). Bauer recognized three members: the upper and lower shale; and a middle member called the Farmington Sandstone.

The lower member is described as a greenish shale and is stated to be 271 to 1,031 feet thick. The middle member sandstone, which is described as tan, fine- to medium-grained sandstone, has a thickness of 20 to 480 feet; and the upper member is described as a greenish gray shale which is 12 to 475 feet thick (Stone et al., 1983; O'Sullivan and Beikman, 1963). According to Stone et al, 1983, the sandstone unit is not restricted to the middle member of the Kirtland Shale; the upper member is quite sandy as well.

In addition to the Kirtland Shale, alluvial and eolian sediments are present at the plant. O'Sullivan and Beikman (1963) mapped the unconsolidated sediments at the plant as Terrace Gravel and described the unit as a "surficial veneer of unconsolidated gravel and on stream-cut terrace surfaces along and near the San Juan River." O'Sullivan and Beikman (1963) also described other alluvial sediments found in the area as "unconsolidated surficial deposits of valley fill, mainly stream-deposited silt, and gravel, but includes some wind-blown sand and silt, colluvial material, and locally, low-level terrace gravels."

4.2 SITE GEOLOGY

In general, based on drill logs from past and 1995 activities, the soil samples described in the investigations consist of a fine sand to fine sandy clay, with some gravel and cobbles. The soil samples from the borings located in the valley or alluvial fans, such as P-10, P-7, P-9, MW-5, MW-8, and MW-9, consist of fine sand to clay. The soil samples from the borings located on the mesas, plateaus, and terraces, such as E-10, E-11, E-9, MW-6, and MW-7, consist of fine sand with some gravel and cobble layers and some consolidated sandstone and shales (KWB&A, 1987a; Philip, 1995)

The uppermost and most prevalent lithology at the plant are alluvial sediments, which KWB&A found to cover the entire surface of the site. KWB&A described these sediments as consisting of "fluvial deposits and, to a lesser extent, terrace deposits of gravel and cobbles."

Beneath the alluvium at the plant are the consolidated sediments of the Kirtland Shale Formation, which include both shale and sandstone members. KWB&A's August, 1987 report (Figure 4-2) shows that the portion of the site that is north of the plant itself are underlain by a shale member of the Kirtland Formation. The plant and the flare hill are underlain by a sandstone member of the Kirtland Formation. South of the plant and the flare hill are Quaternary alluvium and alluvial terrace deposits. The contacts on this map strike east-west, except for where they curve around the flare hill.

- **Flare Pit Geology**
  During remediation of the south flare pit on September 28, 1992, a distinct clay layer was encountered at a depth of approximately 15 feet below the original bottom of the pit, which appeared to limit downward migration of hydrocarbons. Confirmation samples were collected to verify clean soil in the clay layer at the bottom of the pit and the excavation was closed.

5.0 REGIONAL AND SITE HYDROLOGY

5.1 REGIONAL HYDROLOGY

Stone et al 1983, stated that in general, regional groundwater flow in the San Juan Basin is from the topographically high outcrop areas around the edges of the basin, towards the lower outcrop areas. The San Juan River valley is indicated in this report as a main discharge area for the San Juan Basin. Stone et al 1983, also states that ephemeral-stream channels filled with alluvium are the principle locations of groundwater discharge in some areas, and the principle locations of recharge in other areas.

5.2 SITE HYDROLOGY

Figure 6 is a potentiometric surface map drawn using water level measurements taken on July 18, 1995. These measurements indicate a groundwater flow divide that strikes approximately east-west through the plant, approximately paralleling the topographic divide in the same location. KWB&A clarified this groundwater flow divide in Section 3.2.3 of their November, 1987 report. Based on the data collected by EPNG in July of 1995, Philip could not substantiate a breach in the groundwater flow divide described by KWB&A in 1987.

Table 3 and it's graph depict the change in water levels over time at the wells closest to the ponds. Water levels in these wells dropped between June, 1987 and July, 1992, the period in which use of the ponds was discontinued. The wells closest to the ponds, P-2 and P-5, showed the greatest decrease in hydraulic head with drops of approximately 9 feet. Wells P-8, P-9, P-10, and P-11, all down or cross gradient from the ponds, showed decreases in hydraulic head ranging from 3.3 to 5.22 feet.

Figure 6 indicates that, at present, the shallow potentiometric surface approximates the topography of the plant. On the north side of the groundwater flow divide, groundwater appears to follow the drainage to the north, presumably to the valley formed by Stevens Arroyo. On the south side of the groundwater flow divide, groundwater appears to flow in a relatively uniform southerly direction. South of the divide, however, the potentiometric surface is based largely on inference, the actual flow direction may have a westerly or an easterly component that cannot be detected with the geometry of the current wells.

In their 1987 investigation, KWB&A used the Hvorslev Method and the Falling Head Test to calculate hydraulic conductivities for the alluvial sediments at the plant. Tests on wells E1A, E1B, E3, and W2 indicated an average hydraulic conductivity of 2.3 x 10^{-5} centimeters per second (cm/sec) for these sediments. A Falling Head Test conducted on E2B, a well screened in a sandstone member of the Kirtland Shale, indicated a hydraulic conductivity of 3.3 x 10^{-9} cm/sec.

Philip's well logs for MW-9 and MW-5 indicate 5 to 10 feet of loose, silty, or clayey sand on top of hard sand or clay layers. This suggests that in some locations there is a cover of less consolidated material on top of the more consolidated sediments in the northern portion of the plant. This weathered layer may be transporting some of the groundwater at the plant.

During the remediation of the south flare pit, water seepage was noted on the north-center to northwest corner of the pit. Water appeared to be migrating along the top of the impermeable clay layer noted in the excavation. MW-4, which was 200 feet due south of the south flare pit, did not show hydrocarbon contamination in groundwater samples collected in December of 1992. Groundwater was encountered during excavation activities at the north flare pit, but sampling of monitoring well P-8 located 100 feet down gradient of the pit showed no BTEX.

5.3 REGIONAL WATER QUALITY

Specific conductance is used as a measure of water quality; the total dissolved-solids (TDS) concentration in milligrams per liter (mg/L) is about 0.7 times the specific conductance in micromhos (µmhos). Stone et al 1983, states that specific conductance of water from valley-fill aquifers in the San Juan Basin generally ranges from 1,000 µmhos to 4,000 µmhos (2,800 mg/L TDS). Water with the higher conductance values is believed to be contributed by discharge from bedrock sources. Stone et al 1983, found that in the San Juan Basin, "Sodium and sulfate are major constituents in water that has a specific conductance between 1,000 and 4,000 µmhos; chloride commonly is a major ion when specific conductance exceeds 4,000 µmhos."

Site water quality is discussed in detail in Section 6.2 of this report.

5.4 GROUNDWATER USE AND POTENTIAL RECEPTORS

KWB&A concluded in their August, 1987 report that groundwater use in the area around the plant is primarily restricted to shallow groundwater contained in the alluvial sediments. KWB&A identified eight wells that were completed in the shallow alluvial sediments in the vicinity of the plant. These wells are identified in KWB&A's August, 1987 report as being for domestic use. Of these eight, two are located near Stevens Arroyo, the anticipated flowpath for shallow groundwater originating from the plant area. These two wells are both located approximately 80 to 100 feet above the floor of Stevens Arroyo. The depth of these two wells is given as 50 feet. It is unlikely that groundwater traveling at or below the level of the bottom of Stevens Arroyo would affect the groundwater tapped by these wells.

In April, 1996, the New Mexico State Engineers office had records of four wells in the NW 1/4 of Section 11, Township 29 N, Range 15 W. Stevens Arroyo enters the flood-plain of the San Juan River in this quarter section. The wells are between 60 and 25 feet deep and tap aquifers identified as sand and gravel layers.

6.0 SITE DATA RESULTS AND CONCLUSIONS

6.1 RESULTS OF VADOSE ZONE INVESTIGATION

- **General**

Based on data previously collected at the plant, data from above the saturated zone is somewhat limited. GCL identified "petroliferous odors" during the drilling and sampling of P-7, P-10, P-12 and a "solvent odor" in P-10. Soil contamination was identified and removed during the 1992 north and south flare pit remediation project. The July, 1995 RECON® investigation and monitoring well installment, abandonment and replacement project identified soil impacted by BTEX compounds. The evaporation ponds and the areas investigated by the RECON® van were identified by EPNG as areas of concern for vadose zone contamination; both of these areas are discussed under separate headings in this section.

The areas identified as having vadose zone BTEX impacts are at the north end of the plant in and around MW-8 and MW-9. During the RECON® investigation around P-7 and P-10 (replaced by MW-9 and MW-8, respectively) BTEX compounds were detected as stated earlier, but P-11 showed no soil or soil-gas contamination for BTEX above detection limits. During the installation of MW-6, organic compounds were noted while monitoring soil samples with a Photoionization Detector (PID), but soil samples collected for laboratory analysis did not indicate the presence of BTEX compounds. Results from soil samples collected during the 1995 investigation can be found in Table 4 and field screening results can be found on Philip's boring logs found in Appendix A.

In 1992, EPNG conducted a large scale remediation of soils from the north and south flare pits by excavation and landfarming. These remediation activities removed much of the source hydrocarbons at the plant. Closure samples were collected to verify the lack of hydrocarbon contaminants at the bottom of the excavations. These activities were documented by EPNG and reported to the NMOCD.

- **Evaporation Ponds**

  To determine TPH, BTEX, cation, and anion concentrations left in place following closure of the evaporation ponds, soil samples were collected and analyzed by EPNG on August 3, 1995, and August 22, 1995. Samples were collected from three of the ponds at the plant identified as "the old evaporation ponds," Former Pond #1, Former Pond #2 and Former Pond #3 in Figure 2. The Storage Pond referenced in EPNG's reports corresponds to Raw Water Pond #2 shown in Figure 2 of this report. Samples were collected from the lowest part of each pond using a hand auger. At each sampling location, one sample was collected from the surface and one sample was collected from 3 feet below the surface. Soil samples collected in this sampling event were analyzed for common cations and anions, TPH, and BTEX. Cation, anion, and TPH results from these two soil sampling events are summarized in Table 5.

  The results of this soil sampling indicated high levels of common cations and anions in the soils at the surface in the bottom of the ponds. Samples collected 3 feet below ground surface (bgs) generally indicated significantly decreased levels of the common cations and anions when compared to the surface soil samples. TPH levels in the six samples ranged from 42 parts per million (ppm) in Pond #1, 3 feet bgs to 142 ppm at the surface in Pond #1.

  BTEX results for soil samples collected from within the evaporation ponds are documented in an EPNG report dated August 22, 1995. Benzene was not detected in any of these soil samples using USEPA Method 8020. Toluene was detected in one of the samples at 59 parts per billion (ppb). Ethylbenzene was detected in two of the samples at 27 ppb and 140 ppb. Total xylenes were detected in two of the samples at 38 ppb and 330 ppb. These concentrations are well below NMOCD recommended remediation action levels for BTEX.

- **RECON® Investigation Results**

  Based on the soil and soil-gas results from the RECON® investigation, which occurred before wells were replaced, it appears that soil has been impacted to the west and to the south of P-7 (MW-8). BTEX compounds were observed in soil samples collected approximately 20 feet due east of P-7; however soil-gas sample concentrations of BTEX were non-detect at the 40 foot step-out probe hole. BTEX concentrations were not observed at the 20 foot step-out soil-gas probe hole due south of P-7, but were observed in the 3- to 5-foot depth soil sample collected at the 40 foot step-out probe hole. This suggests a south, southeast trend of the localized BTEX contamination at a depth of approximately 3 to 5 feet bgs. Soil sample and soil-gas results can also be found on Figures 3, 4 and 5.

Results from the investigation around P-10 (MW-9) show soil-gas concentrations in the soil to the east and north of P-10. The BTEX compounds diminish to non-detect at the 60 foot step-out probe hole to the east, and concentrations in the 20 and 40 foot step-out probe holes were highest at 6 feet bgs. North of P10, the only sample location showing BTEX was the 20 foot probe hole at a depth of 7.5 feet. These results suggest localized soil contamination to the north, northeast of P-10.

The soil-gas investigation around P-11 showed no appreciable BTEX concentrations in any direction or any depth sampled.

6.2 VADOSE ZONE CONCLUSIONS

- **Vadose Zone Cations and Anions**

  High concentrations of chlorides, sulfate, and sodium remain in the near surface vadose zone in the vicinity of the former Pond #1. Because the ponds are closed and capped with low permeability material, to retard infiltration, and the primary transport mechanism to move the chloride, sulfate, and sodium is gone, it is anticipated that these ions will remain in place with minimal movement caused by infiltration of rainwater. Results of all investigations, including 1995 borehole logs and soil-gas sampling, suggest that the vadose zone in the area of the plant is relatively impermeable.

- **Vadose Zone Hydrocarbons**

  The analytical results of soil sampling obtained prior to closure of the former evaporation ponds indicate that TPH concentrations in the soil range from 42 to 142 milligrams per kilograms (mg/kg). The results of the soil sampling during the installation of monitoring wells MW-5, MW-6, MW-7, and MW-8, down-gradient of the ponds, indicate that concentrations of TPH between 18 and 61 mg/kg remain in the vadose zone in the vicinity of these wells. With the exception of two surface samples, with results of 142 ppm and 126 ppm TPH, from Ponds #1 and #2, respectively, all of the analyses indicate TPH concentrations below the 100 ppm TPH NMOCD guideline standards for remediation of spills, leaks, and releases. These soils were covered when the ponds were closed.

Liquids from the ponds and/or a former collection sump are most likely the source of hydrocarbons in the soil. Because the ponds and the sump are closed, and the primary transport mechanism to move these hydrocarbons is gone, they will remain in place and naturally degrade over time.

The July, 1995 soil-gas survey indicates that soil-gas BTEX concentrations diminish away from the P-7 and P-10 well locations. This could indicate highly localized, or patchy, BTEX contamination in the soils in the vicinity of these wells. Soil samples collected near P-7 confirm BTEX contaminated soils near this well. The BTEX contamination indicated by soil-gas sample analyses near P-10 and P-7 may be indicative of BTEX contaminated soil in that area, or BTEX contaminated water just below the zone from which the soil-gas was collected.

Soil samples collected during the 1995 well installation, replacement and abandonment project indicated that small amounts of BTEX compounds were present in the soil at 30 to 32 feet bgs in MW-5 and at 18.5 to 20.5 feet bgs in MW-8. MW-5 was a new monitoring well installed northwest of areas previously investigated (Figure 2), and MW-8 was the replacement well for P-10 which was also investigated during the RECON® investigation. The results of BTEX analysis for soil samples from the borings for MW-6, MW-7, and MW-9 were below detection limits for all samples collected. Soil sample results from the monitoring well borings are presented in Table 4.

6.3 RESULTS OF GROUNDWATER INVESTIGATION

- **Groundwater Flow Direction**

KWB&A's August, 1987 report used local water supply wells to estimate the regional potentiometric surface and interpreted the data to indicate a regional groundwater flow direction to the south, south-west. The wells at the plant indicate that shallow groundwater flow is more strongly influenced by local topography and geology than by the regional flow direction. Figure 6 shows the potentiometric surface at the plant as interpreted from water levels collected in July, 1995.

- **Groundwater Flow Direction Conclusion**

  Review of existing data indicates that, although the regional groundwater flow appears to be to the south-west, shallow groundwater flow at this site can be estimated by using the plant topography as a guide. A groundwater flow divide is present at the site, trending approximately east-west through the plant. Shallow groundwater to the north of the groundwater flow divide appears to be flowing along an unnamed drainage from the plant area, towards Stevens Arroyo. Shallow groundwater to the south of the groundwater flow divide appears to be flowing to the south, toward a shallow, unnamed, west-trending drainage that eventually merges with Stevens Arroyo.

  Although MW-6 appears to be located south of the groundwater divide the water quality at that location is similar to the water quality of wells on the north side of the groundwater flow divide. This information can be used as evidence supporting the existence of a breach in the groundwater flow divide in the area of E-11.

  The data supports the interpretation that the plant area is characterized by A paleo-stream channel or channels which eroded into the Kirtland Shale Formation. The eroded surface of the Kirtland Formation, and therefore the depths of the sandy, alluvial sediments, appear to be variable across the plant.

- **Groundwater Quality**

  Philip constructed Stiff Diagrams to aid in the interpretation of the groundwater quality data collected from the presently existing wells in July, 1995. Stiff Diagrams provide a quick visual comparison of water quality chemical analyses. Data from two of the “local wells” sampled by KWB&A for their August, 1987 report is also illustrated in Stiff Diagrams for comparison. These two “local wells” are offsite and up-gradient from the plant. Figure 7 shows the Stiff Diagrams for the two local wells outside the plant, Lester and Dailey, and the two wells south of the groundwater divide, W-2 and

MW-4. The KWB&A report indicates that all of these wells are screened in the alluvial sediments. The Stiff Diagrams for W-2 and the Dailey well are very similar. The Dailey well has a high relative concentration of sulfate. The MW-4 Stiff diagram is similar to the Lester well Stiff diagram with the exception that MW-4 has a greater concentration of HCO_3. This difference may be due to locally varying amounts of carbonate cement within the alluvial sediments.

The Stiff Diagrams for wells north of the groundwater divide, MW-5, MW-7, MW-8, and MW-9, are shown in Figure 8. These diagrams indicate a similar quality of groundwater is present at MW-7, MW-5, and MW-9. Specific conductivity values in these wells is generally at least twice that of W-2 and MW-4 on the south side of the divide. Sodium and sulfate appear in much higher relative concentrations in the wells north of the divide than in the wells south of the divide. The only exception to this being MW-8, which is relatively higher in carbonate than in sulfate.

MW-6 is unique, in that it is located south, though very close to the top of the groundwater divide; however, it's Stiff diagram is more similar to the north side well diagrams than those of the south. Two Stiff diagrams for MW-6, one illustrating the July, 1995 results and the other illustrating the October, 1995 results are shown in Figure 9. These diagrams indicate a water quality similar to wells north of the divide; with the exception of high relative chloride levels in July, 1995. In October, 1995, the chlorides appeared similar to the remaining north side wells.

Figure 10 is a groundwater chloride concentration map. This map indicates that chloride concentrations are highest in the area of former ponds 2 and 3. A similar pattern is indicated by TDS concentrations. Figure 11 shows the most recent TDS results for all wells, past and present, at the plant. Figure 12 shows the recent sulfate results for all wells, past and present, at the plant. MW-5 located down-gradient from the ponds at the edge of the plant boundary does not appear to be affected by chloride. In MW-5, sodium and sulfates appear similar to MW-7 and MW-9.

- **Groundwater Quality Conclusion**

Groundwater quality is poor throughout the area. The two offsite wells sampled by KWB&A in 1987, exceeded several New Mexico Water Quality Control Committee

(NMWQCC) standards. The Lester well exceeded NMWQCC standards for sulfate and TDS. The Dailey well exceeded NMWQCC standards for chloride, sulfate, and TDS. Similarly, the wells south of the groundwater divide at the plant, W-2 and MW-4, do not meet NMWQCC standards for those parameters. Table 6 summarizes these results.

North of the groundwater flow divide, water quality remains poor and is relatively elevated in sodium and sulfate. For the October, 1995 sampling event, the average TDS for the four wells north of the groundwater divide was 15,275 micrograms per liter (mg/L). For the same sampling event the average TDS for the two wells south of the groundwater divide was 4,460 mg/L.

The groundwater north of the groundwater divide, as well as groundwater at MW-6, may have been affected by wastewater from the plant that was stored in the former ponds. The magnitude of this effect is difficult to quantify, as there is no current data from surrounding domestic wells. The former wastewater ponds have not received wastewater since their use was discontinued sometime between 1988 and 1989. The difference in water quality between wells north and south of the groundwater divide, indicate that the wells to the north have been affected by poor quality recharge. This source of recharge was removed when use of the ponds ceased in 1988 or 1989.

Virtually every well sampled at the plant had or has elevated chlorides, sulfates and TDS concentrations above NMWQCC standards. This is mostly likely due to a combination of poor background water quality and historical wastewater discharge which ceased in 1989.

- **Groundwater Hydrocarbon Impacts**

Historical data indicates BTEX impacted groundwater at the plant. Groundwater samples from wells P-7, MW-9, MW-8, P-10, and P-11 have shown BTEX above NMWQCC standards as indicated on Table 7. Well P-9 showed only one round of sampling in May, 1986, with benzene above standards. All subsequent sampling events of P-9 showed concentrations below NMWQCC standards. MW-8 and MW-9 were installed by Philip during the 1995 well abandonment and replacement project. MW-9 was a replacement well for P-7 and MW-8 was a replacement well for P-10.

After well installation, groundwater samples collected by EPNG on July 18, 1995, showed BTEX compounds present in MW-4, MW-8, and MW-9. BTEX concentrations found in this sampling of MW-4 were below NMWQCC standards, but were above standards in MW-8 and MW-9. October, 1995, sample results showed no BTEX compounds in MW-4. Monitor wells MW-5, MW-8, and MW-9 were also sampled in May and August 1996, 1997, and May 1998. Benzene concentrations in monitor wells MW-8 and MW-9 are above NMWQCC standards. BTEX results for all sampling events are presented in Table 7.

No BTEX was detected in samples collected from P-11 in December, 1985 and May, 1986; however, in July of 1992, 340 ppb were detected. Free product was also detected in this well in July, 1992. P-11 was abandoned in 1995 and replaced by MW-7. No BTEX was detected in groundwater samples collected from MW-7 The soil-gas survey did not detect any BTEX in the vicinity of P-11. Analytical results from soil samples collected from the MW-7 boring indicated no BTEX compounds present; however, TPH was detected at 18 mg/kg. This data suggests that BTEX concentrations and free product detected in P-11 are a local anomaly. The possibility cannot be ruled out that someone introduced a small amount of free phase hydrocarbons directly into the monitoring well P-11. The additional data collected during the installation of MW-7 and the 1995 soil-gas survey indicate that there is not a pervasive BTEX problem at this location.

The soil-gas survey conducted in July, 1995 in the vicinity of P-10 detected BTEX in soil-gas 20 feet to the north and 40 feet to the east of P-10. No BTEX was detected in soil-gas at 3, 6, and 9 feet depths, 60 feet to the east of P-10. BTEX was not detected to the south and west of P-10. In July, 1995, groundwater sampling at MW-8, the well replacing P-10, indicated 510 ppb benzene and 687 ppb total BTEX.

The soil-gas survey conducted in July, 1995 in the vicinity of P-7 detected BTEX in soil gas 20 feet to the east of P-7. Forty feet to the east, BTEX was detected at 1 ppb. To the south, west, and north of P-7, BTEX was detected in small concentrations. A soil sample collected 40 feet to the south of P-7 did detect BTEX at a depth of 3 to 5 feet. In July, 1995, groundwater sampling at MW-9, the well replacing P-7 indicated 140 ppb benzene and 250 ppb total BTEX.

- **Hydrocarbon Impacts Conclusion**

Based on data collected in this phase of work, it appears that soil and groundwater have been impacted in the areas of MW-8 and MW-9 by BTEX compounds. Although soil samples from MW-8 and MW-9 boreholes were either very low or non-detect for BTEX, soil-gas samples collected during the RECON® investigation suggest some soil impact in the area. Possible sources for soil-gas BTEX impact include desorption from soil particles and volatilization from the groundwater surface.

Groundwater results from MW-8 and MW-9 are above NMWQCC standards for BTEX, which are consistent with historical data from the wells they replaced (P-10 and P-7). MW-7 showed no evidence of soil or groundwater impact during drilling, or the RECON® investigation. This is not consistent with historical data from P-11, the well it replaced. Based on data from the 1995 investigation, it would appear that impact indicated at P-11 is localized and does not appear to be migrating in the direction of MW-7, and maybe due to introduced material.

Soil-gas survey results indicate that soil-gas BTEX levels drop off in all directions away from MW-8 and MW-9. This may indicate that soil and groundwater BTEX contamination is of limited areal extent. If this is the case, the source of the contamination may be small, isolated points created by past improper waste disposal or by unauthorized, illegal dumping. The areas around these wells are not protected from unauthorized entry. Another possibility is that the fine grained soils tested during the RECON® investigation have a low vapor permeability. If this is the case, then BTEX vapors may not have been detected because they could not travel through the soil pores from the source, whether it be diffusion from contaminated soil or groundwater, to the sampling equipment. If the soil permeability is low enough to limit vapor diffusion, it may also be low enough to limit contaminant mobility in both the vapor and dissolved phases.

The monitoring well locations and analytical results where groundwater impacted by hydrocarbons were detected are shown in Figure 13. Hydrocarbon impact appears confined to the wells located down-gradient of former Pond #1 and the location of a former collection sump as shown in Figure 2. The collection basin received waste from a flare drain, the sulfur plant boiler blowdown drain, the sulfur plant sump drain, and the boiler blowdown drain. This information was obtained from an October, 1976 air photo, modified in 1985 to show the location of used oil, pigging liquid, and hydrocarbon drip liquid tanks (EPNG Drawing Number 520214-1). Pond #1 received waste from essentially all of the plant drains not plumbed into the collection sump system. Immediately south and west of the collection sump are two natural gas intake lines and a products line that runs through the plant. These pipelines and their associated pigging operations may also have been a source of hydrocarbons, or may have provided a conduit for hydrocarbon migration from the former collection sump.

A hydrocarbon source may have been removed when the collection sump was abandoned and the ponds and flare pit closed. Based on the high benzene concentrations present in the groundwater, additional investigation in the collection sump area and the areas adjacent to MW-8 and MW-9 may clarify whether or not the collection sump or other unidentified areas are a continuing source of impact. If the former collection sump and the soils beneath the former ponds are not continuing sources the dissolved hydrocarbons present in the groundwater may degrade naturally over time. MW-5, the down-gradient well location at the plant boundary, has not shown any hydrocarbon impacts.

- **pH**

  Two of the new monitoring wells installed by Philip and sampled by EPNG showed pH levels outside of the NMWQCC standards range. After installation in July, 1995, MW-9 had a pH of 4.83, and a pH of 4.67 in October of 1995. After installation in July, 1995, MW-6 also showed a pH value of 4.63, and a pH of 4.79 in October of 1995. Sample results with pH outside of the NMWQCC range can be found in Table 6. Based on wastewater analysis from the KWB&A Phase I report, none of the wastewater had pH values in this range.

- **pH Conclusion**

  MW-9 is located down-gradient of a former collection sump shown on EPNG Drawing No. 5292:14-1 (1986) to have received waste from the sulfur recovery area. On this photo, a 2-inch, steel pipe labeled "*sulfur plant blowdown*", and a 2-inch PVC pipe labeled "*sulfur plant sump drain*" are shown draining to this collection sump. A draft report written by GCL in October of 1986 documenting wastewater flow measurements, states, "*The two drain lines from the sulfur plant produce such small amounts of effluent as to be insignificant and no attempt was made to measure these effluents or include them in the estimates (of wastewater production).*" Another report written by GCL in March, 1986 indicated that discharge from the "sulfur sludge pit" entered the collection area of pond #1. It further states that the discharge from the sulfur sludge pit is a "*...very minor discharge compared to overall wastewater production.*"

One cause of the low pH in MW-9 may be sulfuric acid formed by the oxidation of sulfur recovery plant wastes. If the wastes were oxidized, by exposure to air, to sulfur trioxide (SO_3), the SO_3 could combine with atmospheric water or groundwater to form sulfuric acid. If the acid was formed in the former collection sump or the former pond #1, it could have traveled from these areas as a diluted solution in groundwater to MW-9.

Another cause of low pH in MW-9 may be gaseous H_2S associated with the nearby pipelines. Both the San Juan-Aneth and Barker Dome Lines carry sour gas. Small leaks of natural gas from these pipelines could provide enough H_2S to the groundwater to give it an H_2S odor. Water with small amounts of H_2S will also form a weak acid. In sampling events from 1992 to 1995, an H_2S odor was noted at monitoring well P-10, near both MW-9 and the gas lines. However, MW-8, the well installed in 1995 to replace P-10, has a pH close to neutral in the July and October, 1995 sampling events.

MW-6 does not appear to have any surficial features or potential subsurface features that would explain the low pH values in groundwater. However, as indicated by the KWB&A Phase I report, a possible breach in the groundwater divide could exist in this area; resulting in seepage from the ponds flowing towards MW-6. Undocumented spills or past improper disposal practices may be responsible for the low pH at this well, if either of the two processes noted above is responsible. Another possibility for the cause of the low pH at both MW-6 and MW-9 could be the oxidation of organic matter in the subsurface. Oxidation of organic matter produces CO_2 which combines with water to produce H_2CO_3, a weak acid. The weak acid formed in this way usually has a pH of approximately 5.7 (Fetter, 1988). No historical data for pH is available prior to July, 1995; therefore, results cannot be confirmed over time. Resampling and continued monitoring of pH in these two wells is warranted.

- **Metals**

Based on laboratory results supplied to Philip by EPNG, the groundwater from two wells had metals concentrations that were above the NMWQCC standards. MW-6 and W-2 had reported values of .3 and .4 mg/L, respectively, for selenium, which is above the NMWQCC standard for selenium of .05 mg/L. Additionally the July, 1995 sampling event showed cadmium in groundwater in W-2 to be 0.018 mg/L, which is slightly above the NMWQCC standard of 0.01 mg/L. The results from the July, 1995 and May, 1996 sampling for metals are presented in Table 6. Between the two sampling events, MW-9 indicated a slight increase in cadmium concentrations, barium and selenium levels remained at or near non-detectable levels. MW-8 indicated a slight drop in cadmium levels from the July, 1995 to the May, 1996 sampling events; barium and selenium remained at or near non-detectable levels. Samples collected at MW-7 indicate that selenium level went from non-detect in July, 1995 to 0.424 mg/L in May, 1996. This selenium level is above the NMWQCC standard of 0.05 mg/L. Barium and cadmium remained at or near non-detectable levels. Samples collected in MW-6 indicated small concentrations of selenium, barium, and cadmium, all below NMWQCC standards. None of the three metals mentioned above were detected in samples collected from W-2 in May, 1996. Samples collected from MW-4 indicated that levels of selenium, barium, and cadmium are at or near non-detectable levels, and are below NMWQCC standards. In May, 1996 none of the three metals mentioned above were detected in MW-5.

- **Metals Conclusion**

There is no historical data to confirm metals concentrations over time. Selenium is known to be naturally occurring in concentrations of 0.6 mg/kg in shales which are present at the plant. Cadmium also occurs naturally in shale at concentrations of 0.3 mg/kg (from Turekian, 1971; Martin and Meybeck, 1979 and other sources).

- **Nitrates**

Based on sample results supplied by EPNG, elevated nitrate above NMWQCC standards of 10 mg/L exist in several wells at the plant. The following wells indicated elevated nitrate levels: P-5, P-8, P-11, E-10, E-11, MW-6, and W-2. Of these wells, only P-11, MW-7, E-10, E-11, W-2 and MW-6 indicated levels above NMWQCC standards in the most recent sampling events. Sample results for nitrates are presented in Table 6.

In the May, 1996 sampling event W-2 was slightly above the NMWQCC standard at 11.5 mg/L. W-2 has historically indicated nitrate between 8 and 13 mg/L. For the four sampling events between December, 1992 and October, 1993 nitrate was not detected in this well. MW-7 also indicated nitrate levels above the NMWQCC standard, at 24.9 mg/L, in May, 1996. Since MW-7's construction in July, 1995, nitrate has been detected in groundwater samples collected in three separate sampling events at approximately the same levels. P-11, the well that MW-7 replaced, also indicated nitrate in previous sampling events with levels varying from 26 to 103 mg/L. Relatively high levels of nitrate were detected in MW-6 in May, 1996 at 167 mg/L. In the three sampling events since it's construction in July, 1995, groundwater samples collected from MW-6 have indicated nitrate levels between 82 and 167 mg/L. E-10 and E-11, both located in the vicinity of MW-6 also indicated similar nitrate levels in groundwater samples collected between July, 1992 and their abandonment in July, 1995.

In KWB&A's 1987a report, wastewater analyses indicated that only the boiler blowdown contained nitrate. Nitrate levels in this waste stream were indicated as approximately 9 mg/L. No other possible source for the higher nitrate levels was identified. Sewage discharges and agricultural fertilizers are common sources of nitrate and nitrogen in groundwater, there may be unidentified sources of these types, perhaps associated with past land uses, in the plant area. The wells closest to the plant boundaries, W-2 south of the groundwater divide and MW-5 north of the groundwater divide, show low or non-detectable nitrate. W-2 indicated 11.5 mg/L in May, 1996 and MW-5 indicated that nitrate was not detected in May, 1996.

7.0 RECOMMENDATIONS

7.1 VADOSE ZONE

Studies to date do not indicate pervasive contamination of the vadose zone at the plant. Additional investigation in the areas adjacent to MW-8 and MW-9 may clarify the source of groundwater BTEX impacts at these wells. Investigation in the area of the former collection sump could clarify whether or not this is a source of BTEX contamination. The hydrocarbons in the vadose zone do not appear an additional threat to human heath, welfare or the environment. Left alone the hydrocarbons in the vadose zone will naturally degrade.

7.2 GROUNDWATER

Philip believes that the BTEX compounds in the groundwater are coming from hydrocarbons that are absorbed onto clay and naturally occurring organic carbon particles within the soil. This natural attenuation has limited the migration of BTEX. Due to a depletion of oxygen in the groundwater the natural degradation process of the BTEX has proceeded slowly.

Philip proposes that EPNG collect groundwater samples and have them analyzed for nutrient content. If the groundwater is deficient in nutrients, urea nitrate should be mixed into 500 gallons of potable water, 7 parts water to 1 part urea nitrate. Hydrogen peroxide should be added to bring the dissolved oxygen concentration of the water to 20 milligrams per liter. EPNG should then inject the water into the monitoring well. This procedure can also be used on other monitoring wells in the vicinity of the ones with groundwater over NMWQCC standards.

Following nutrient injection, EPNG should fill the monitoring wells with magnesium peroxide socks (socks) to provide a continuing source of oxygen to the groundwater.

Following a minimum of three months of treatment with the socks, and two weeks prior to groundwater sampling, the socks should be removed. If the groundwater concentrations of BTEX are below NMWQCC standards, EPNG should collect groundwater samples on a weekly basis. If the concentrations of BTEX increase to above standards, EPNG should re-treat the monitoring wells and reinsert the socks. If the concentrations of BTEX remain below standards EPNG should apply for closure. If the use of nutrients and oxygenates do not prove beneficial, EPNG should discontinue their use and, provided that the concentrations of contaminants decrease for two sampling events, apply for closure.

Semi-annual groundwater sampling should be continued at MW-8, MW-9, MW-7, MW-4, MW-6, and MW-5. Groundwater samples from these wells should be sampled for BTEX, common cations and anions, nitrate, TDS and pH. Semi-annual sampling should continue at these wells to track levels of these parameters and should be discontinued after two consecutive sampling events indicate that they are below NMWQCC standards.

8.0 REFERENCES

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- Philip Environmental Services Corporation, "Soil Gas and Soil Survey, San Juan River Plant, Kirtland, New Mexico", August, 1995.

TABLES

Chronology of Work Done at the San Juan River Plant EPNG

TABLE 1

Date	Author	Event
December, 1985	Raba Kistner	Analytical Report for Hydrogeologic and Geologic Study
January, 1986	GCL	Phase I Drilling Program Preliminary Report
February, 1987	KWB&A	Proposal to Perform a Land Application Feasibility Study
August, 1987	KWB&A	Land Application Feasibility Study Phase I Final Report
November, 1987	KWB&A	Land Application Feasibility Study Phase II Final Report
January, 1988	KWB&A	Proposal to Prepare a Closure Plan For the Wastewater Ponds and Flare Pits
April, 1988	KWB&A	Soil Sampling Plan for Wastewater Impoundment
June, 1988	KWB&A	Closure Plan for Wastewater Impoundments and Flare Pits
December, 1989	KWB&A	Closure Plan Field Study for the SJRP
January 18, 1991	KWB&A	Response to comments on the Closure Plan
January 28, 1991	B. Campbell,EPNG	Response to above Response
May 2, 1991	Hutchins,EPNG	Submitted flare pit closure plan, submitted wastewater impoundment closure plan
August 30, 1991	Hutchins, EPNG	Plans to close raw water pond, pump back pond, no compaction of cover materials
September 30, 1991	NMOCD	Questions about borrow soil, wicking; Work element to address hydrocarbons at P-10; Work element to address nitrogen at MW-4; Require closure of north and south flare pits
November 18, 1991	NMOCD	Landfarm areas discussed

Chronology of Work Done
at the San Juan River Plant
EPNG

TABLE 1

Date	Author	Event
12/1/1991	KWB&A	Final Closure Plan for Wastewater Impoundments and Flare Pits
September 1992	KWB&A	Water Balance Simulation for the EPNG SJRP Wastewater Pond Cover System
September 16, 1992	Miller, EPNG	Discussion of flare pit closure details; Monitoring Well analyses MW-4, W-2, P-8
February 1993	Miller, EPNG	Informal discussion of simple cap for wastewater ponds
August 1995	Philip	Soil Gas and Soil Survey
August 1995	Philip	Monitoring Well Installation, Upgrade, and Abandonment
May 1997-May 1998	EPNG	Additional Groundwater Sampling of Monitor Wells MW-5, MW-8, and MW-9

TABLE 2

LOCATION	ACTION	TD	SCREENED INTERVAL
E1B	Abandoned	79.8	76-71
E1A	Abandoned	59.0	58.9-53.9
E2B	Abandoned	78.6	78.5-73.5
E3	Abandoned	78.5	77-72
E9	Abandoned	30.0	Open, 30-40
E11	Abandoned	24.8	Open at 30
MW-1	Abandoned	93.3	92-77
MW-2	Abandoned	81.5	80-74
MW-3	Abandoned	83.1	83-63
P-2	Abandoned	23.4	NA
P-9	Abandoned	20.0	NA
P-5	Abandoned	21.5	NA
P-7	Abandoned and replaced by MW-9	18.5	NA
P-10	Abandoned and replaced by MW-8	15.0	NA
P-11	Abandoned and replaced by MW-7	30.1	NA
MW-4	Upgraded	57.7	54-34
W-2	Upgraded	36.5	60.5-55.5
P-8	Abandoned	23.4	NA
E-10	Abandoned	33.0	Open, 25-40
MW-5	New well installed 6/95	38.0	30.0-15.0
MW-6	New well installed 6/95	43.0	40.0-20.0
MW-7	New well replacing P-11	30.5	30.0-15.0
MW-8	New well replacing P-10	20.5	20.0-5.0
MW-9	New well replacing P-7	22.0	20.0-5.0

TD = Total depth below ground surface in feet.

Screened Intervals are in feet below ground surface

NA - Not Available

Number of decimal places shown in this table are taken directly from well logs

Groundwater Depth Data
San Juan River Plant

TABLE 3

Monitoring Well	Jun-87	Jul-92	Dec-92	Apr-93	Jul-93	Oct-93	Sep-94	Apr-95
P-02	8.4	17.4	18.3	18.85	19.1	19.3	20.3	
P-05	9.43	18.5	19.1	19.7	19.85	20.1	21	
P-07	1.15		3.4	2.65	3.1	3	4.15	3.5
P-08	8.2	11.5	12.2	11.8	12.15	12.4	13	
P-09	5.25	10.25	11.1	10.5	11.05	11.3	12.6	12.3
P-10	3.7	7.05	9.1	7.3	7.65	8.4	8.85	8.4
P-11	14.18	19.4	20.8	21.1	20.95	21	22.25	22.6

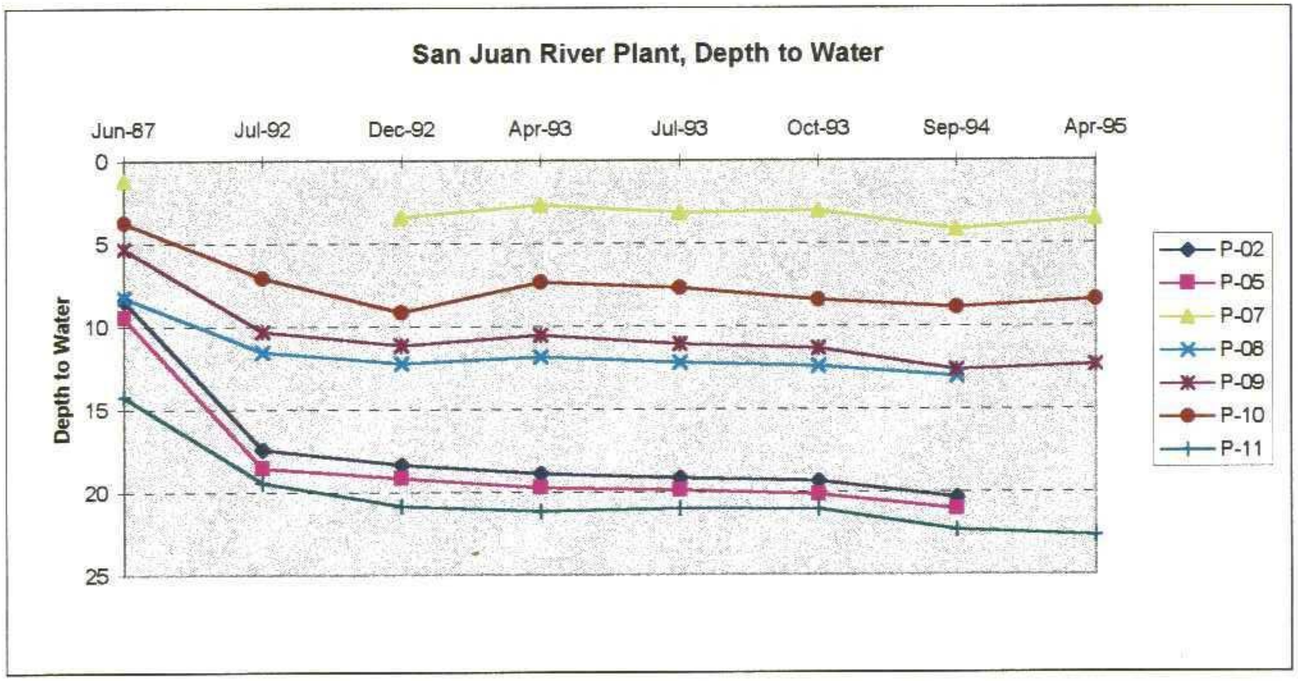

San Juan River Plant, Depth to Water

TABLE 4

Soil Sampling Results
July 1995

WELL	SAMPLE NAME	DEPTH (feet)	TPH (mg/kg)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYLBENZENE (mg/kg)	XYLENES (mg/kg)	Total BTEX (mg/kg)
MW-5	MW5 S6	30-32	55	<0.025	0.15	<0.025	0.041	0.19
MW-6	MW6 S4	18-20	50	<0.025	<0.025	<0.025	<0.025	<0.10
MW-7	MW7 S4	18.5-20.5	18	<0.025	<0.025	<0.025	<0.025	<0.10
MW-8	MW8 S3	13.5-15.5	61	<0.025	<0.025	<0.025	<0.025	<0.10
MW-8	MW8 S3-1	13.5-15.5	51	<0.025	<0.025	<0.025	<0.025	<0.10
MW-8	MW8 S4	18.5-20.5	39	<0.025	0.027	0.033	0.1	0.16
MW-9	MW9 S1	3-5	55	<0.025	<0.025	<0.025	<0.025	<0.10

TABLE 5

Soil Sampling Results
Evaporation Ponds
August 1995

Location	Calcium (ppm)	Magnesium (ppm)	CaCO3 (ppm)	Chloride (ppm)	Sulfate (ppm)	Potassium (ppm)	Sodium (ppm)	Conductivity (umhos)	TPH (mg/kg)
Pond #1, Surface	318	458	2,680	49,352	23,319	133	39,855	75,000	142
Pond #1, 3' Subsurface	25	9	99	985	2,120	<2	1,559	4,000	42
Pond #2, Surface	351	58	1,115	24	37,463	129	37,862	32,500	126
Pond #2, 3' Subsurface	143	55	584	140	9,546	10	5,113	10,100	90
Pond #3, Surface	413	110	1,484	20	47,647	65	20,746	26,000	49
Pond #3 3' Subsurface	293	32	863	28	9,767	15	5,583	10,500	72
Storage Pond, Surface	662	108	2,098	45	1,695	32	121	25,000	77
Storage Pond, 3' Subsurface	584	82	1,796	24	1,478	7	75	2,100	44

TPH = Total Petroleum Hydrocarbons

Pond #1 = Former Pond #1 on Figure 2 of this report

Pond #2 = Former Pond #3 on Figure 2 of this report

Pond #3 = Former Pond #4 on Figure 2 of this report

Storage Pond = Raw Water Pond #2 on Figure 2 of this report

Historical Results for Wells Above NMWQCC Standards (BTEX Excluded)

Date Month/Year	Well ID	Well Status	pH (units)	Chloride mg\L	Sulfate mg/L	TDS mg/L	Nitrate mg/L	Selenium mg/L	Barium mg/L	Cadmium mg/L
NA = not analyzed				ND = not detected				NF = well not found		
NMWQCC STANDARDS			**4-6**	**250**	**600**	**1,000**	**10**	**0.05**	**1.0**	**0.05**
Dec-85	P-2	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jan-86	P-2	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mar-86	P-2	NA	NA	NA	NA	NA	NA	NA	NA	NA
May-86	P-2	NA	NA	6530	5470	NA	2	NA	NA	NA
Jul-92	P-2	NA	NA	7985	4518	19720	3.25	NA	NA	NA
Dec-92	P-2	NA	NA	NA	NA	NA	NA	NA	NA	NA
Apr-93	P-2	NA	NA	NA	NA	21200	NA	NA	NA	NA
Jul-93	P-2	NA	NA	NA	NA	21220	NA	NA	NA	NA
Oct-93	P-2	NA	NA	NA	NA	21260	NA	NA	NA	NA
Sep-94	P-2	Abandoned		8410	4229	21300	1.1	NA	NA	NA
Dec-85	P-4	NA	NA	NA	NA	13600	NA	NA	NA	NA
Jan-86	P-4	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mar-86	P-4	NA	NA	NA	NA	NA	NA	NA	NA	NA
May-86	P-4	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jul-92	P-4	NA	NA	NF	NF	NF	NF	NA	NA	NA
Dec-92	P-4	Abandoned		NF	NF	NF	NF	NA	NA	NA
Dec-85	P-5	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jan-86	P-5	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mar-86	P-5	NA	NA	NA	NA	NA	NA	NA	NA	NA
May-86	P-5	NA	NA	3840	3820	NA	35.4	NA	NA	NA
Jul-92	P-5	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dec-92	P-5	NA	NA	NA	NA	NA	NA	NA	NA	NA
Apr-93	P-5	NA	NA	NA	NA	15550	NA	NA	NA	NA
Jul-93	P-5	NA	NA	NA	NA	15890	NA	NA	NA	NA
Oct-93	P-5	NA	NA	NA	NA	16460	NA	NA	NA	NA
Sep-94	NA	Abandoned		NA	NA	NA	NA	NA	NA	NA
Dec-85	P-6	NA	NA		NA	22400	NA	NA	NA	NA
Jan-86	P-6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mar-86	P-6	NA	NA	NA	NA	NA	NA	NA	NA	NA
May-86	P-6	NA	NA	621	16500	NA	ND	NA	NA	NA
Jul-92	P-6	NA	NA	NF	NF	NF	NF	NA	NA	NA
Dec-92	P-6	Abandoned		NF	NF	NF	NF	NA	NA	NA
Dec-85	P-7	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jan-86	P-7	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mar-86	P-7	NA	NA	NA	NA	NA	NA	NA	NA	NA

Historical Results for Wells Above NMWQCC Standards (BTEX Excluded)

TABLE 6

Date Month/Year	Well ID	Well Status	pH (units)	Chloride mg\L	Sulfate mg/L	TDS mg/L	Nitrate mg/L	Selenium mg/L	Barium mg/L	Cadmium mg/L
	NA = not analyzed				ND = not detected				NF = well not found	
NMWQCC STANDARDS			4-6	250	600	1,000	10	0.05	1.0	0.05
May-86	P-7	NA	NA	101	7140	NA	ND	NA	NA	NA
Jul-92	P-7	NA	NA	218	5600	6665	ND	NA	NA	NA
Dec-92	P-7	NA	NA	NA	NA	NA	NA	NA	NA	NA
Apr-93	P-7	NA	NA	NA	NA	14290	NA	NA	NA	NA
Apr-93	P-7	NA	NA	NA	NA	14020	NA	NA	NA	NA
Jun-93	P-7	NA	NA	NA	NA	14480	NA	NA	NA	NA
Oct-93	P-7	NA	NA	NA	NA	14940	NA	NA	NA	NA
Sep-94	P-7	NA	NA	304	8807	14290	< 0.1	NA	NA	NA
Apr-95	P-7	Abandoned		NA	NA	NA	NA	NA	NA	NA
Jul-95	MW-9	New	4.83	516	9417	16700	< 0.1	< 0.1	0.02	0.008
Oct-95	MW-9		4.67	436	11457	16340	<0.1	NA	NA	NA
Oct-95	MW-9 Dup		4.79	412	11392	16460	<0.1	NA	NA	NA
May-96	MW-9		5.4	549	10949	16780	<1.6	<0.005	<0.50	0.013
May-96	MW-9 Dup		5.4	561	11025	16920	<1.6	<0.005	<0.50	0.013
Aug-96	MW-9		5	613	11580	17320	<2.1	<0.010	0.073	0.005
Dec-85	P-8		NA	NA	NA	16900	NA	NA	NA	NA
Jan-86	P-8		NA	NA	NA	NA	NA	NA	NA	NA
Mar-86	P-8		NA	NA	NA	NA	NA	NA	NA	NA
May-86	P-8		NA	7200	14300	NA	43.6	NA	NA	NA
Jul-92	P-8		NA	2505	12250	14485	15.5	NA	NA	NA
Dec-92	P-8		NA	NA	NA	NA	NA	NA	NA	NA
Apr-93	P-8		NA	NA	NA	30080	NA	NA	NA	NA
Jul-93	P-8		NA	NA	NA	30070	NA	NA	NA	NA
Jul-93	P-8		NA	NA	NA	30140	NA	NA	NA	NA
Oct-93	P-8		NA	NA	NA	30570	NA	NA	NA	NA
Sep-94	P-8	Abandoned		9291	10088	31380	1.1	NA	NA	NA
Dec-85	P-9		NA	NA	NA	16900	NA	NA	NA	NA
Jan-86	P-9		NA	NA	NA	NA	NA	NA	NA	NA
Mar-86	P-9		NA	NA	NA	NA	NA	NA	NA	NA
May-86	P-9		NA	291	10000	NA	ND	NA	NA	NA
Jul-92	P-9		NA	1008	9000	7920	3.47	NA	NA	NA
Dec-92	P-9		NA	NA	NA	NA	NA	NA	NA	NA
Apr-93	P-9		NA	NA	NA	13950	NA	NA	NA	NA
Jun-93	P-9		NA	NA	NA	14180	NA	NA	NA	NA
Oct-93	P-9		NA	NA	NA	14260	NA	NA	NA	NA
Sep-94	P-9	Abandoned		1703	8316	13860	0.7	NA	NA	NA

Historical Results for Wells Above NMWQCC Standards (BTEX Excluded)

TABLE 6

Date Month/Year	Well ID	Well Status	pH (units)	Chloride mg\L	Sulfate mg/L	TDS mg/L	Nitrate mg/L	Selenium mg/L	Barium mg/L	Cadmium mg/L
NA = not analyzed				ND = not detected				NF = well not found		
NMWQCC STANDARDS			4-6	250	600	1,000	10	0.05	1.0	0.05
~~Dec-85~~	~~P-10~~		~~NA~~	~~NA~~	~~NA~~	~~NA~~	~~NA~~	~~NA~~	~~NA~~	~~NA~~
Jan-86	P-10		NA	NA	NA	NA	NA	NA	NA	NA
Mar-86	P-10		NA	NA	NA	NA	NA	NA	NA	NA
May-86	P-10		NA	NA	NA	NA	NA	NA	NA	NA
Jul-92	P-10		NA	300	7500	7965	3.1	NA	NA	NA
Dec-92	P-10		NA	NA	NA	NA	NA	NA	NA	NA
Apr-93	P-10		NA	NA	NA	24990	NA	NA	NA	NA
Jun-93	P-10		NA	NA	NA	23460	NA	NA	NA	NA
Oct-93	P-10		NA	NA	NA	15800	NA	NA	NA	NA
Sep-94	P-10		NA	299	7778	15340	< 0.1	NA	NA	NA
Apr-95	P-10	Abandoned		NA	NA	NA	NA	NA	NA	NA
Jul-95	MW-8	New	7.08	159	2912	8540	< 0.1	< 0.1	0.06	0.005
Oct-95	MW-8		7.21	191	3739	8880	<0.1	NA	NA	NA
May-96	MW-8		7.16	164	2963	7940	<1.1	<0.005	<0.50	0.002
Aug-96	MW-8		7.1	NA	3506	9200	<0.6	<0.01	0.059	<.0004
Dec-85	P-11		NA	NA	NA	19000	NA	NA	NA	NA
Jan-86	P-11		NA	NA	NA	NA	NA	NA	NA	NA
Mar-86	P-11		NA	NA	NA	NA	NA	NA	NA	NA
May-86	P-11		NA	93.2	6540	NA	26.7	NA	NA	NA
Jul-92	P-11		NA	280	8203	9285	103	NA	NA	NA
Dec-92	P-11		NA	NA	NA	NA	NA	NA	NA	NA
Apr-93	P-11		NA	NA	NA	19470	NA	NA	NA	NA
Jul-93	P-11		NA	NA	NA	19130	NA	NA	NA	NA
Oct-93	P-11		NA	NA	NA	19220	NA	NA	NA	NA
Oct-93	P-11		NA	NA	NA	19210	NA	NA	NA	NA
Sep-94	P-11		NA	294	11539	19530	50	NA	NA	NA
Apr-95	P-11	Abandoned		287	11437	19940	39	NA	NA	NA
Jul-95	MW-7	New	6.91	311	10387	18980	29.6	< 0.1	0.02	< 0.005
Oct-95	MW-7		6.83	278	10368	15900	25.7	NA	NA	NA
May-96	MW-7		6.9	364	9517	15520	24.9	0.424	<0.50	0.003
Aug-96	MW-7		6.9	381	9526	15380	22.1	<0.01	0.002	<0.0004
Dec-85	P-12		NA	NA	NA	NA	NA	NA	NA	NA
Jan-86	P-12		NA	NA	NA	NA	NA	NA	NA	NA
Mar-86	P-12		NA	NA	NA	NA	NA	NA	NA	NA

TABLE 6

Historical Results for Wells Above NMWQCC Standards (BTEX Excluded)

Date Month/Year	Well ID	Well Status	pH (units)	Chloride mg\L	Sulfate mg/L	TDS mg/L	Nitrate mg/L	Selenium mg/L	Barium mg/L	Cadmium mg/L
NA = not analyzed				ND = not detected				NF = well not found		
NMWQCC STANDARDS			4-6	250	600	1,000	10	0.05	1.0	0.05
May-86	P-12		NA	74	833	NA	1.77	NA	NA	NA
Jul-92	P-12		NA	NF	NF	NF	NF	NA	NA	NA
Dec-92	P-12	Abandoned		NF	NF	NF	NF	NA	NA	NA
Apr-95	E-1B		NA	325	3075	5630	8.4	NA	NA	NA
Apr-95	E-1B(D)	Abandoned		317	3081	5660	8.4	NA	NA	NA
Apr-95	E-3	Abandoned		531	3234	6470	2.2	NA	NA	NA
Jul-92	E-10		NA	602	7220	6890	65.3	NA	NA	NA
Dec-92	E-10		NA	NA	NA	NA	NA	NA	NA	NA
Apr-93	E-10		NA	NA	NA	13560	NA	NA	NA	NA
Jul-93	E-10		NA	NA	NA	13880	NA	NA	NA	NA
Oct-93	E-10		NA	NA	NA	14030	NA	NA	NA	NA
Sep-94	E-10		NA	923	7417	13930	141.4	NA	NA	NA
Apr-95	E-10	Abandoned		910	7304	13840	157.1	NA	NA	NA
Jul-92	E-11		NA	NA	NA	NA	NA	NA	NA	NA
Dec-92	E-11		NA	NA	NA	NA	NA	NA	NA	NA
Apr-93	E-11		NA	NA	NA	10180	NA	NA	NA	NA
Jul-93	E-11		NA	NA	NA	10490	NA	NA	NA	NA
Oct-93	E-11		NA	NA	NA	10450	NA	NA	NA	NA
Sep-94	E-11		NA	1155	5703	10850	174.5	NA	NA	NA
Apr-95	E-11	Abandoned		1140	5078	10710	180.9	NA	NA	NA
Jul-95	MW-6	New	4.63	10461	4997	18460	82.7	0.3	0.02	0.018
Oct-95	MW-6		4.79	884	11131	17360	126	NA	NA	NA
May-96	MW-6		5.01	1108	10361	17360	167.5	<0.005	<0.50	0.018
Aug-96	MW-6		4.8	1103	10513	17440	159.2	0.246	0.049	0.01
Jul-92	W-2		NA	679	3944	3234	13.8	NA	NA	NA
Dec-92	W-2		NA	NA	NA	NA	NA	NA	NA	NA
Apr-93	W-2		NA	NA	NA	6430	NA	NA	NA	NA
Jun-93	W-2		NA	NA	NA	6480	NA	NA	NA	NA
Oct-93	W-2		NA	NA	NA	6540	NA	NA	NA	NA
Sep-94	W-2		NA	613	3402	6440	0.77	NA	NA	NA
Jul-95	W-2		7.18	564	3320	6320	8.3	0.4	0.01	< 0.005
Oct-95	W-2		7.46	454	3747	5900	9.5	NA	NA	NA
May-96	W-2		7.66	503	3509	5990	11.5	NA	NA	NA
Aug-96	W-2		7.5	480	3367	5860	10.3	0.177	0.016	<0.0004

Historical Results for Wells Above NMWQCC Standards (BTEX Excluded)

TABLE 6

Date Month/Year	Well ID	Well Status	pH (units)	Chloride mg\L	Sulfate mg/L	TDS mg/L	Nitrate mg/L	Selenium mg/L	Barium mg/L	Cadmium mg/L
NA = not analyzed				ND = not detected				NF = well not found		
NMWQCC STANDARDS			**4-6**	**250**	**600**	**1,000**	**10**	**0.05**	**1.0**	**0.05**
~~Oct-87~~	~~MW-1~~		~~NA~~	~~170~~	~~2800~~	~~4800~~	~~3.1~~	~~NA~~	~~NA~~	~~NA~~
Mar-88	MW-1		NA	175	4190	6710	5.82	NA	NA	NA
Sep-94	MW-1	Abandoned		411	3763	6970	1.7	NA	NA	NA
Oct-87	MW-2		NA	320	3000	5400	0.21	NA	NA	NA
Mar-88	MW-2		NA	347	3360	6040	0.07	NA	NA	NA
Sep-94	MW-2	Abandoned		539	3109	6300	< 0.1	NA	NA	NA
Oct-87	MW-3		NA	110	1900	3300	0.87	NA	NA	NA
Mar-88	MW-3		NA	208	3510	5810	0.45	NA	NA	NA
Sep-94	MW-3	Abandoned		354	3079	5720	0.7	NA	NA	NA
Mar-88	MW-4		NA	267	1340	4260	0.02	NA	NA	NA
Jul-92	MW-4		NA	164	1200	1734	3.12	NA	NA	NA
Dec-92	MW-4		NA	233	950	3090	NA	NA	NA	NA
Apr-93	MW-4		NA	NA	NA	3680	NA	NA	NA	NA
Jun-93	MW-4		NA	NA	NA	3610	NA	NA	NA	NA
Oct-93	MW-4		NA	NA	NA	3680	NA	NA	NA	NA
Sep-94	MW-4		NA	148	1024	3804	< 0.1	NA	NA	NA
Jul-95	MW-4		6.94	129	843	3600	0.6	< 0.1	0.02	< 0.005
Oct-95	MW-4		6.85	116	1076	3384	<0.1	NA	NA	NA
May-96	MW-4		6.89	143	1001	3448	<1.1	<0.005	<0.50	0.006
Aug-96	MW-4		6.9	146	990	3500	<0.6	6.01	0.041	0.003
Jul-95	MW-5	New	7.59	251	11613	20060	< 0.1	< 0.1	0.02	< 0.005
Jul-95	MW-5 Dup		7.61	243	11551	20100	< 0.1	< 0.1	0.02	< 0.005
Oct-95	MW-5		7.36	165	14415	20080	<0.1	NA	NA	NA
May-96	MW-5		7.15	246	13572	20260	<1.1	<0.005	<0.50	<0.0004
Aug-96	MW-5		7.5	256	13097	19800	<1.1	<0.01	<0.02	<0.0004
1987	Lester	off site	NA	110	780	1400	<0.1	NA	NA	NA
1987	Dailey	off site	NA	450	2470	4300	<0.1	NA	NA	NA

The results of EPNG's August 1996 groundwater sampling are included in this Table, but are not referenced in the report.

Historical BTEX Results

TABLE 7

Date Month/Year	Well ID	Well Status	Benzene ug/L	Toluene ug/L	Ethylbenzene ug/L	Xylene ug/L
NMWQCC STANDARD			10	750	750	620
Dec-85	P-7		1320	ND	ND	ND
Jan-86	P-7		100	ND	NA	41
Mar-86	P-7		4000	ND	5100	NA
May-86	P-7		ND	ND	ND	ND
Jul-92	P-7		ND	ND	ND	40
Dec-92	P-7		567	16.7	232	1047
Apr-93	P-7		491	NA	214	1748
Apr-93	P-7		466	NA	213	1531
Jun-93	P-7		471	NA	209	1208
Oct-93	P-7		844	33.3	288	1970
Sep-94	P-7		430	15.7	208	1540
Apr-95	P-7	Abandoned	452	8.48	189	1693
Jul-95	MW-9		140	0.6	25	85
Oct-95	MW-9		124	<2.5	26	128
May-96	MW-9		113	<1.0	17.8	42.7
May-96	MW-9		103	<1.0	16.7	31.9
Aug-96	MW-9		75.2	1.03	26.8	132
May-97	MW-9		84.9	<1.0	8.2	7.95
Aug-97	MW-9		106	<1.0	12	21.8
May-98	MW-9		89.5	<1.0	8.51	5.61
May-86	P-9	Abandoned	162	ND	ND	ND
Dec-85	P-10		12800	318	ND	ND
Jan-86	P-10		1900	839	NA	369
Mar-86	P-10		ND	ND	NA	ND
May-86	P-10		445	ND	NA	ND
Jul-92	P-10		5600	250	240	1200
Dec-92	P-10		ND	225	388	941
Apr-93	P-10		3315	NA	407	1300
Jun-93	P-10		9790	NA	832	2880
Oct-93	P-10		3310	11.4	133	379
Sep-94	P-10		1015	<2.0	51	174
Apr-95	P-10	Abandoned	1693	34.2	92.7	338
Jul-95	MW-8		510	0.8	46	130
Oct-95	MW-8		488	3.3	33.7	95.8
May-96	MW-8		79.1	<5.0	<5.0	35.4
Aug-96	MW-8		427	1.03	17.3	71.3
May-97	MW-8		141	<1.0	3.78	35.1
Aug-97	MW-8		307	2.92	6.93	20.7
May-98	MW-8		449	<1.0	13.9	62.9
Dec-85	P-11		ND	ND	ND	ND
Jan-86	P-11		NA	NA	NA	NA

Historical BTEX Results

TABLE 7

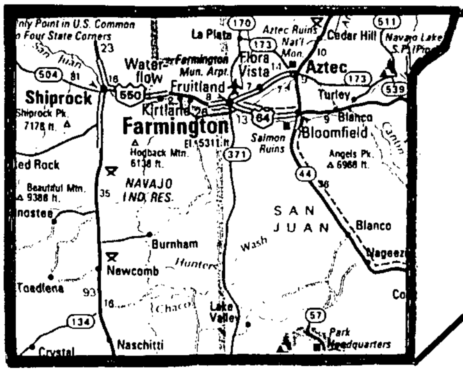
Date Month/Year	Well ID	Well Status	Benzene ug/L	Toluene ug/L	Ethylbenzene ug/L	Xylene ug/L
NMWQCC STANDARD			**10**	**750**	**750**	**620**
Mar-86	P-11		NA	NA	NA	NA
May-86	P-11		ND	ND	ND	ND
Jul-92	P-11		340	210	60	310
Dec-92	P-11		981	208	122	1141
Apr-93	P-11		524	NA	15.9	281
Jul-93	P-11		277	NA	9.7	428
Oct-93	P-11		349	ND	8	408
Oct-93	P-11		ND	ND	7.4	395
Sep-94	P-11		260	360	200	1400
Apr-94	P-11	Abandoned	195	7.46	5.96	38.9
Jul-92	W-2		ND	ND	ND	ND
Dec-92	W-2		ND	ND	ND	6.6
Apr-93	W-2		ND	ND	ND	2.7
Jun-93	W-2		ND	ND	ND	ND
Oct-93	W-2		ND	ND	ND	ND
Sep-94	W-2		<0.5	<0.5	<0.5	<0.5
Jul-95	W-2		<0.5	<0.5	<0.5	<0.5
Oct-95	W-2		<2.5	<2.5	<2.5	<7.5
May-96	W-2		<1.0	<1.0	<1.0	<3.0
Aug-96	W-2		<1.0	<1.0	<1.0	<3.0
Jul-95	MW-7		<0.5	<0.5	<0.5	<0.5
Oct-95	MW-7		<2.5	<2.5	<2.5	<7.5
May-96	MW-7		<1.0	<1.0	<1.0	<3.0
Aug-96	MW-7		<1.0	<1.0	<1.0	<3.0
Mar-88	MW-4		0.44	ND	0.5	ND
Jul-92	MW-4		ND	ND	ND	ND
Dec-92	MW-4		5.4	ND	ND	3.1
Apr-93	MW-4		ND	ND	ND	ND
Jun-93	MW-4		ND	ND	ND	ND
Oct-93	MW-4		4.5	ND	2	ND
Sep-94	MW-4		<0.1	<2.0	<2.0	<2.0
Jul-95	MW-4		0.7	<0.5	<0.5	1.4
Oct-95	MW-4		<2.5	<2.5	<2.5	<7.5
May-96	MW-4		<1.0	<1.0	<1.0	<3.0
Aug-96	MW-4		<1.0	<1.0	<1.0	<3.0
Jul-95	MW-5		<0.1	<0.5	<0.5	<0.5
Oct-95	MW-5		<0.1	<0.5	<0.5	<0.5
May-96	MW-5		<1.0	<1.0	<1.0	<3.0
Aug-96	MW-5		<1.0	<1.0	<1.0	<3.0
May-97	MW-5		<1.0	<1.0	<1.0	<3.0
Aug-97	MW-5		<1.0	<1.0	<1.0	<3.0
May-98	MW-5		<1.0	<1.0	<1.0	Not Analyzed

TABLE 7

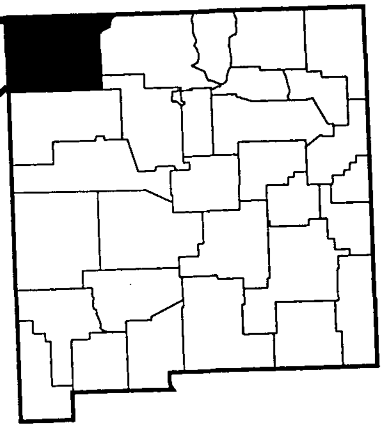
Date Month/Year	Well ID	Well Status	Benzene ug/L	Toluene ug/L	Ethylbenzene ug/L	Xylene ug/L
NMWQCC STANDARD			**10**	**750**	**750**	**620**
Jul-95	MW-6		<0.5	<0.5	<0.5	<0.5
Oct-95	MW-6		<2.5	<2.5	<2.5	<7.5
May-96	MW-6		<1.0	<1.0	<1.0	<3.0
Aug-96	MW-6		<1.0	<1.0	<1.0	<3.0

Wells P-2, P-4, P-5, P-6, P-8, P-12, E1-B, E-3,E-10,E-11, MW-1, MW-2, MW-3 have not had BTEX detected.

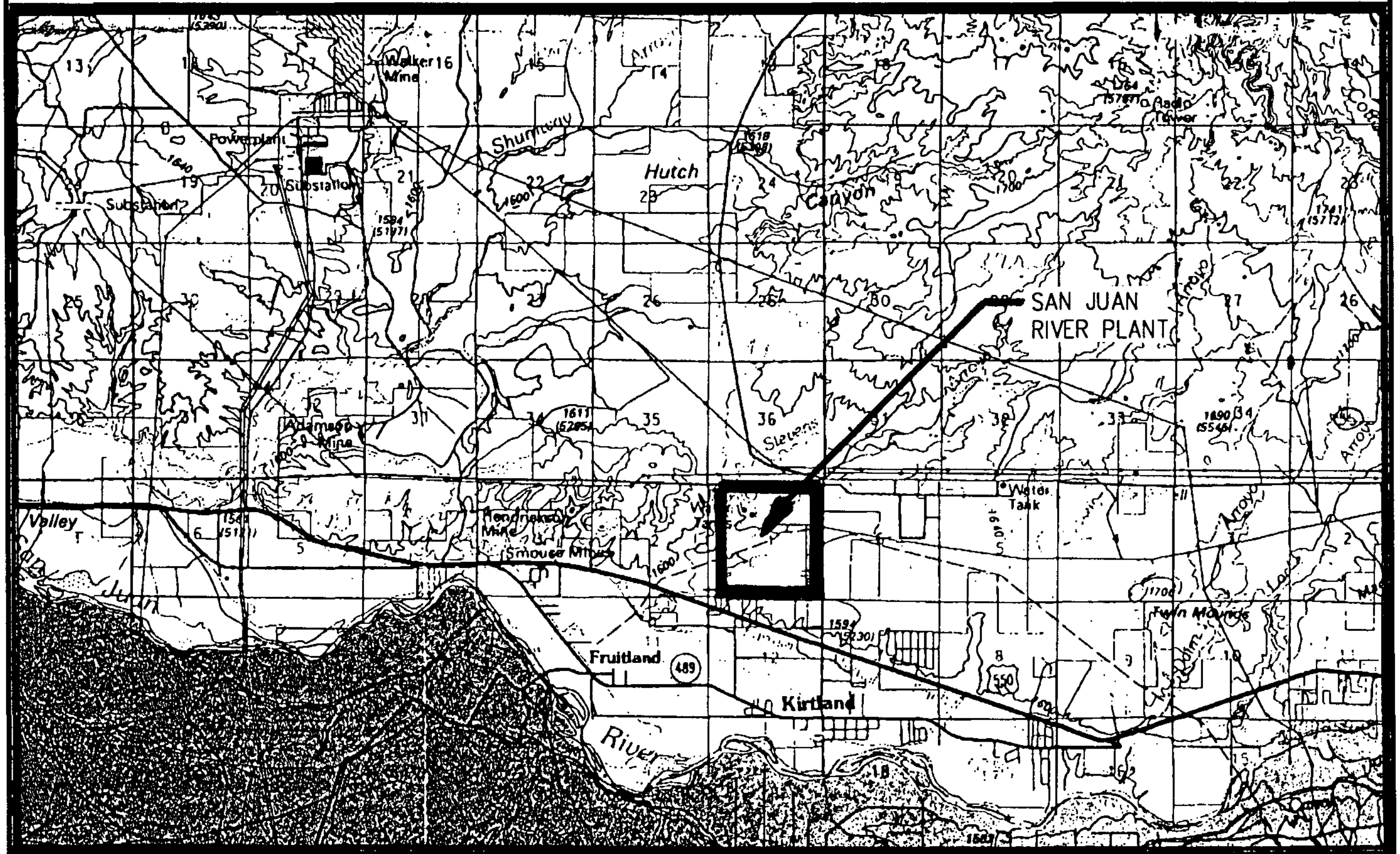
FIGURES



SAN JUAN COUNTY



NEW MEXICO



SITE VICINITY MAP

PHILIP
ENVIRONMENTAL

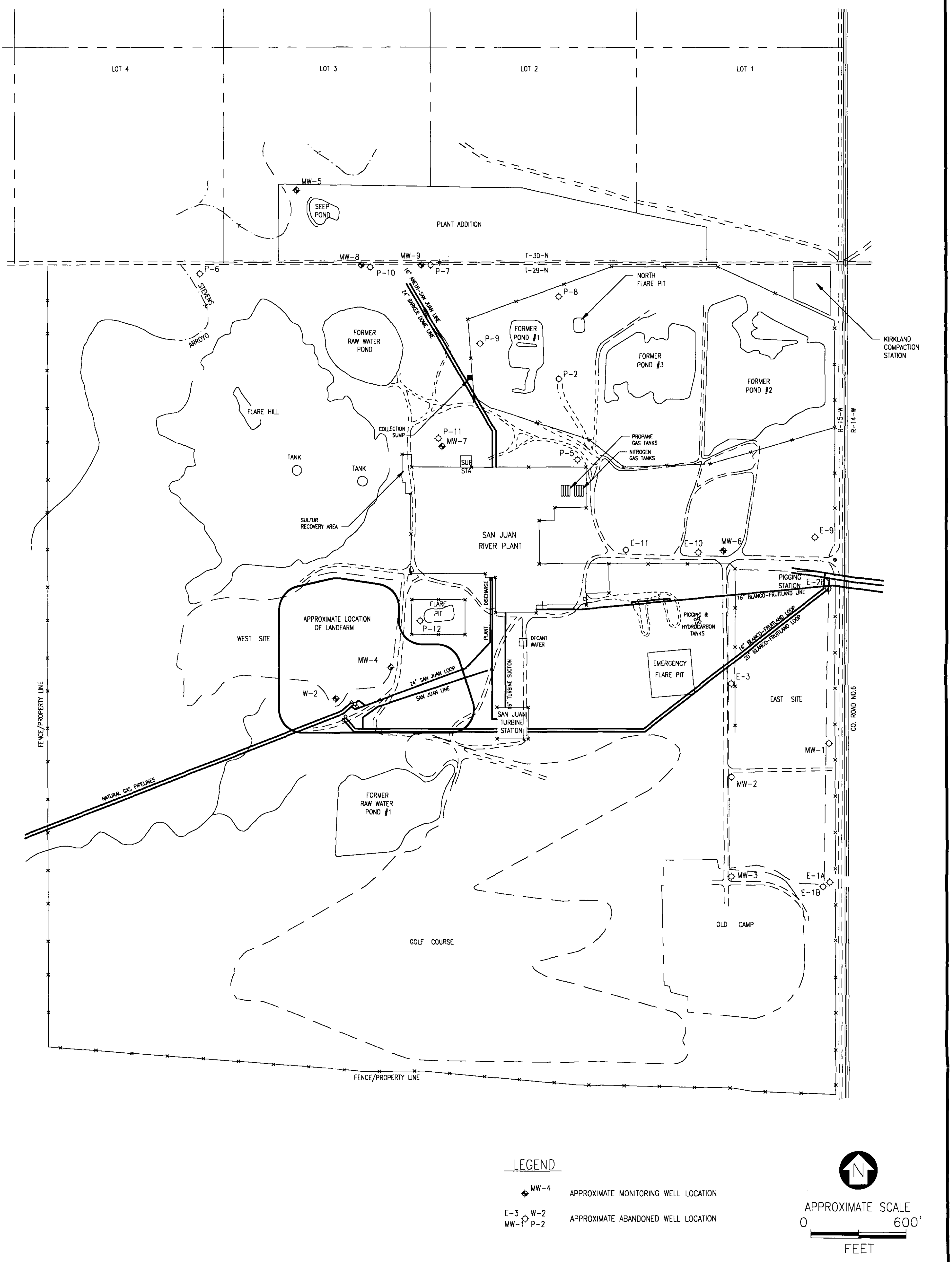
TITLE:
SITE LOCATION MAP
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

SCALE	NOTED	DATE
DWN:	M.R.W.	4/16/96
DES:		
CHKD:		
APPD:		

PROJECT NO: 14323
EL PASO NATURAL GAS COMPANY

FIGURE 1
REV: 0

COL. J:\14323\CIV\CL011



J:\14323\CIV\CL007

PHILIP
ENVIRONMENTAL

NO.	REVISION	BY	APPR.	DATE
1	REVSIED LOCATION OF WELLS MW-6, P-7, P-10 & P-11	M.R.W.		6/4/96

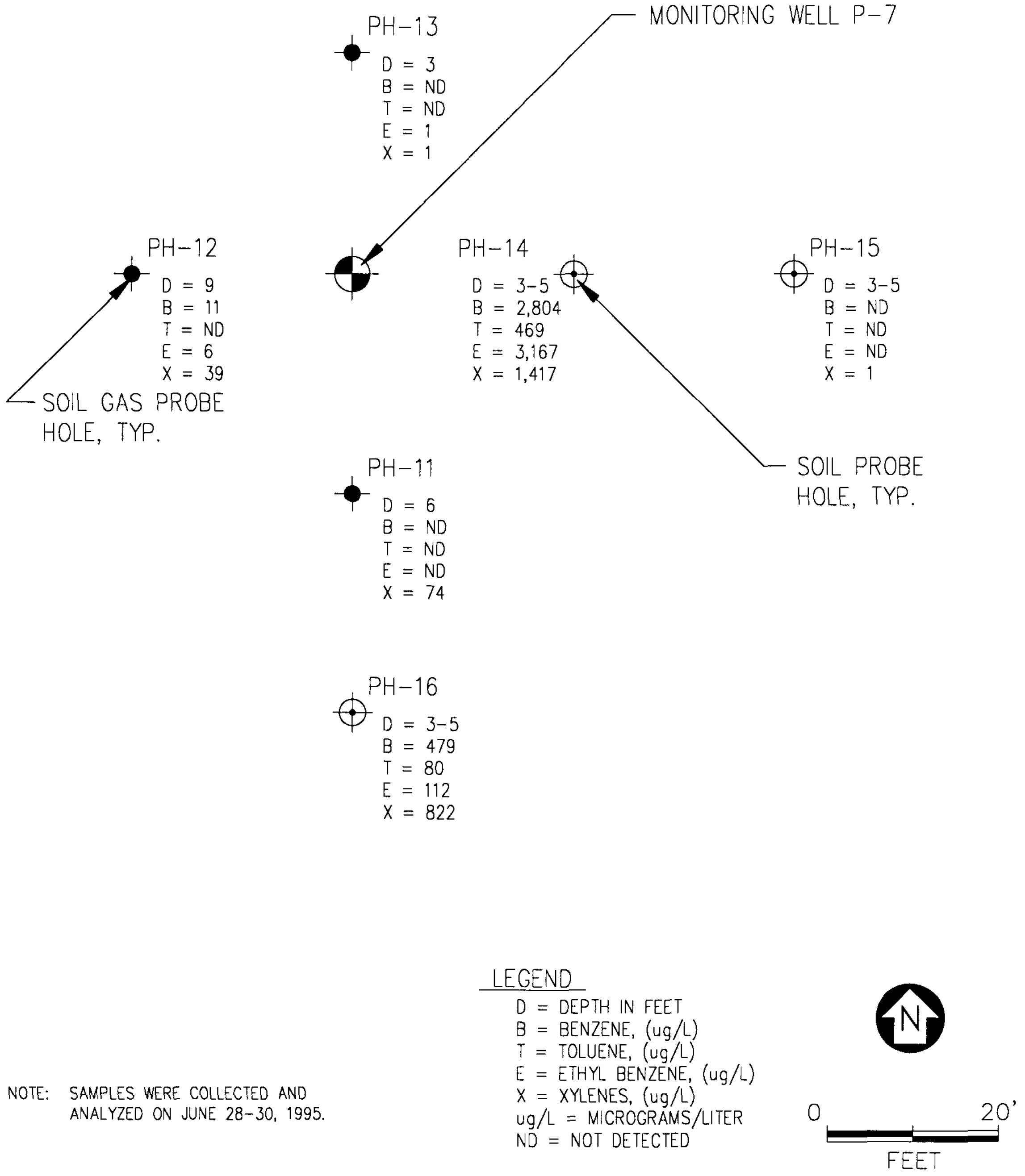
TITLE:
SITE/WELL LOCATION PLAN
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

SCALE AS NOTED
DATE
DWN: M.R.W. 4/16/96
DES:
CHKD:
APPD:

PROJECT NO: 14323
EL PASO NATURAL GAS COMPANY

FIGURE 2
REV: 1

COL. J:\14323\CIV\CL007



NOTE: SAMPLES WERE COLLECTED AND ANALYZED ON JUNE 28-30, 1995.

PHILIP
ENVIRONMENTAL

TITLE:
RECON INVESTIGATION
MONITORING WELL P-7
SAN JUAN RIVER PLANT

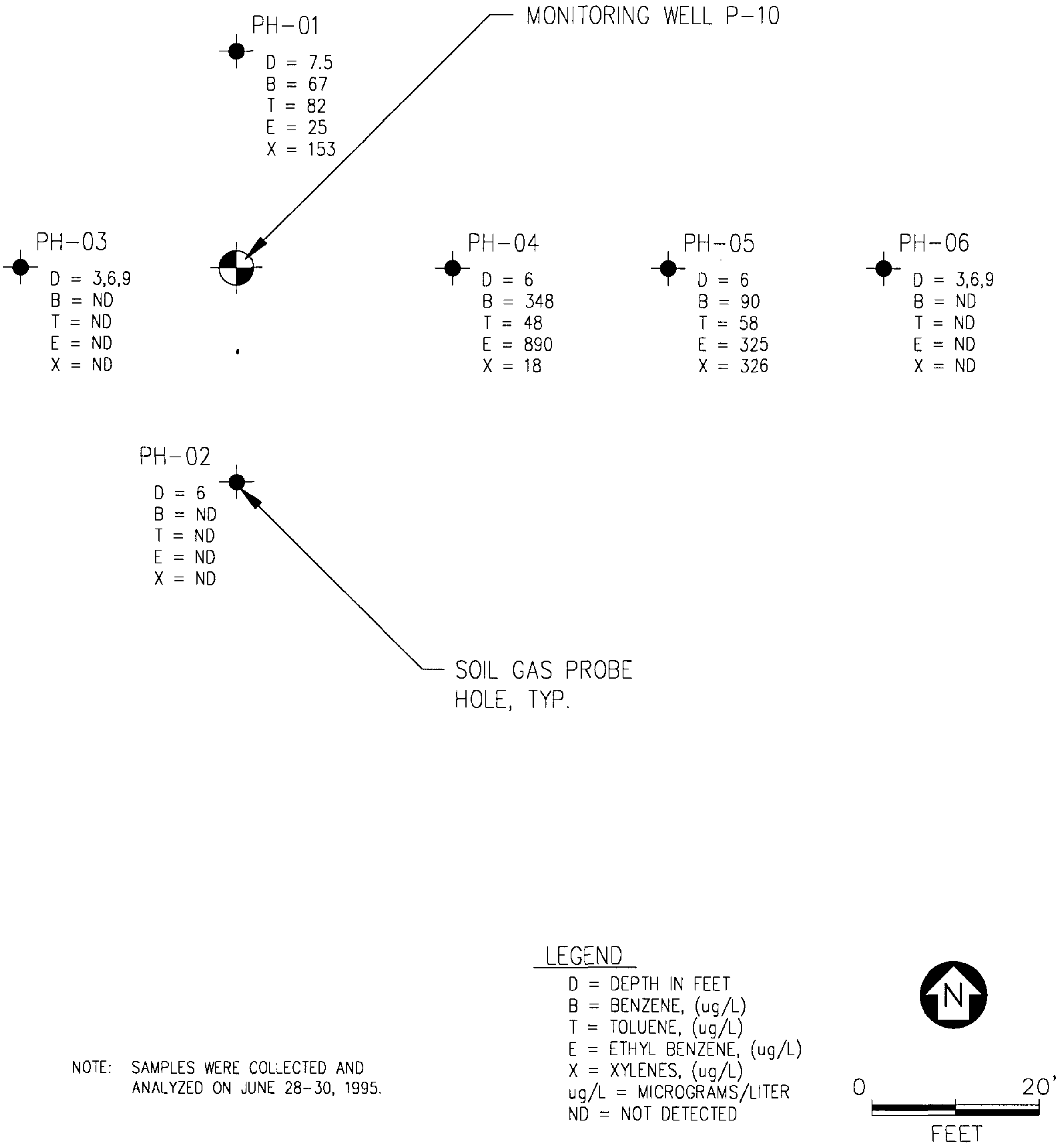
SCALE	NOTED	DATE
DWN:	M.R.W.	9/6/95
DES:		
CHKD:		
APPD:		

PROJECT NO: 14323
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

FIGURE 3

REV: 0

COL. J:\14323\CIV\CL008

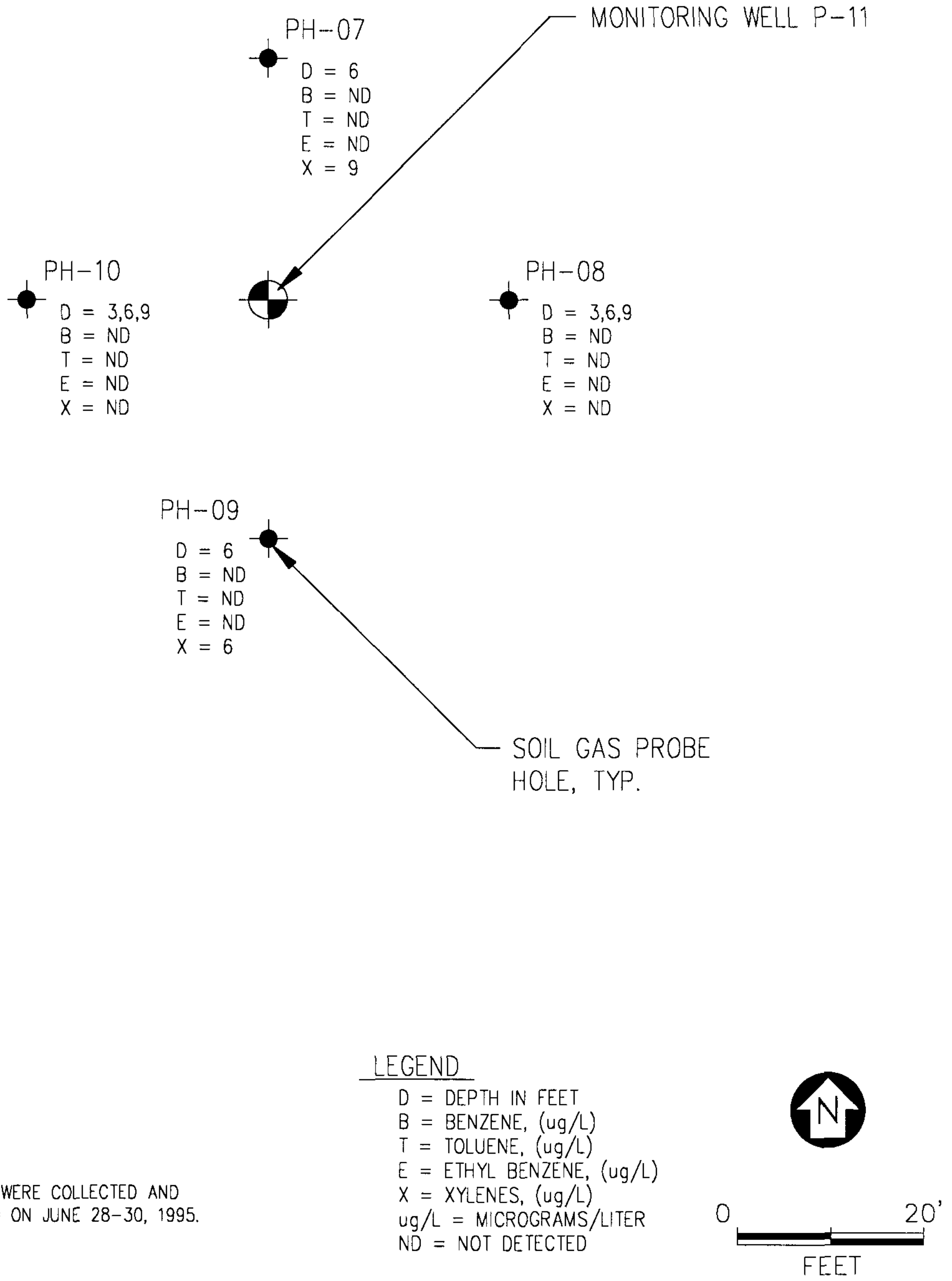


LEGEND
D = DEPTH IN FEET
B = BENZENE, (ug/L)
T = TOLUENE, (ug/L)
E = ETHYL BENZENE, (ug/L)
X = XYLENES, (ug/L)
ug/L = MICROGRAMS/LITER
ND = NOT DETECTED

NOTE: SAMPLES WERE COLLECTED AND ANALYZED ON JUNE 28-30, 1995.

PHILIP ENVIRONMENTAL	TITLE: MONITORING WELL P-10 SAN JUAN RIVER PLANT KIRTLAND, NEW MEXICO	SCALE NOTED	DATE	PROJECT NO: 14323 SAN JUAN RIVER PLANT KIRTLAND, NEW MEXICO
		DWN: M.R.W.	9/6/95	
		DES:		FIGURE 4
		CHKD:		REV: 0
		APPD:		

COL. J:\14323\CIV\CL009



LEGEND

D = DEPTH IN FEET
B = BENZENE, (ug/L)
T = TOLUENE, (ug/L)
E = ETHYL BENZENE, (ug/L)
X = XYLENES, (ug/L)
ug/L = MICROGRAMS/LITER
ND = NOT DETECTED

NOTE: SAMPLES WERE COLLECTED AND ANALYZED ON JUNE 28-30, 1995.

PHILIP
ENVIRONMENTAL

TITLE:
MONITORING WELL P-11
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

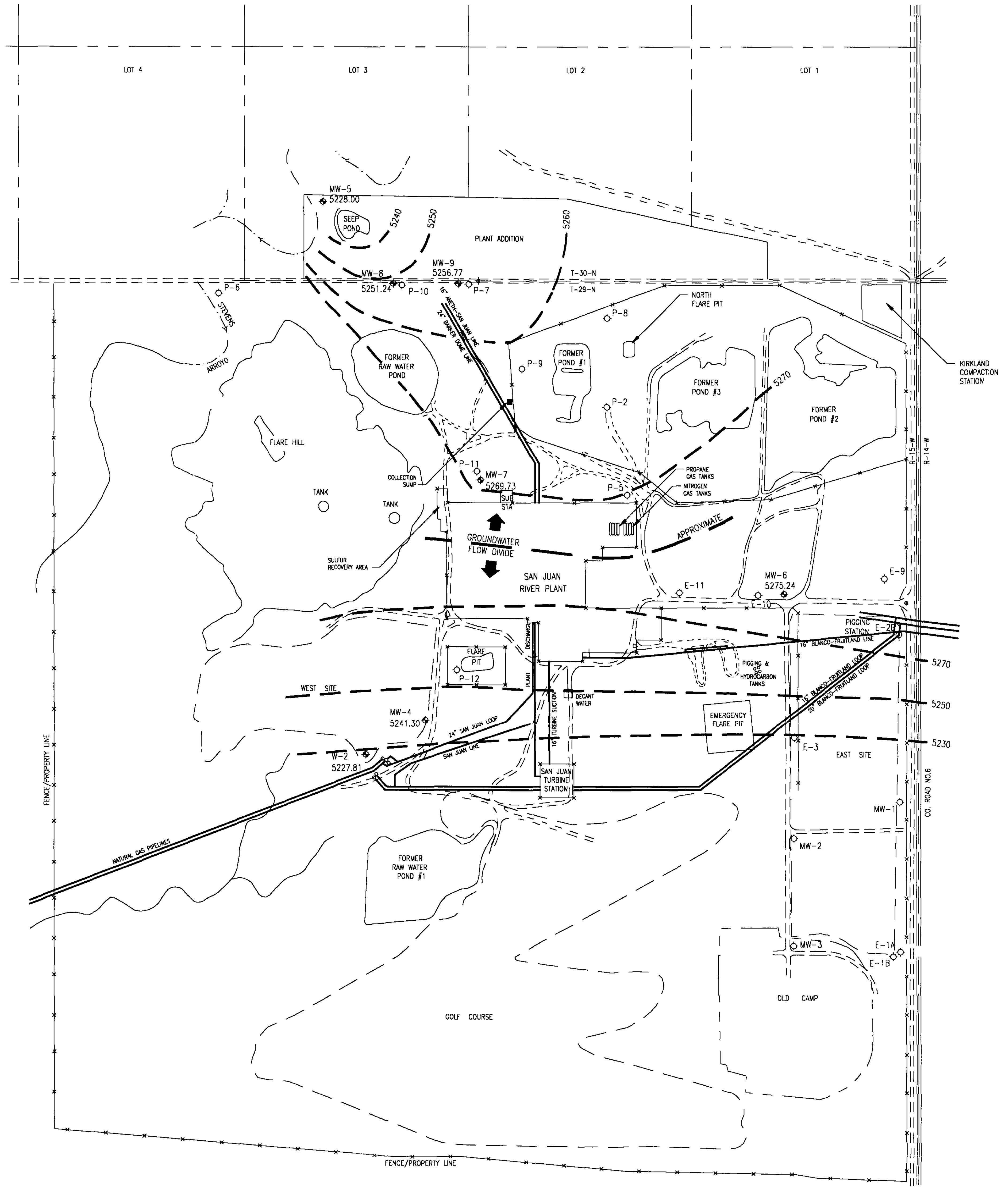
SCALE	NOTED	DATE
DWN:	M.R.W.	9/6/95
DES:		
CHKD:		
APPD:		

PROJECT NO: 14323
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

FIGURE 5

REV: 0

COL. J:\14323\CIV\CL010



NOTE: POTENTIOMETRIC SURFACE WAS DRAWN USING THE WELLS WITH THE POTENTIOMETRIC SURFACE ELEVATION NOTED. TOPOGRAPHY AND ABANDONED WELL PREVIOUS WATER LEVELS WERE ALSO USED FOR FURTHER INTERPRETATION IN DRAWING THIS FIGURE.

LEGEND

◈ MW-4 5241.30	APPROXIMATE MONITORING WELL LOCATION WITH POTENTIOMETRIC SURFACE ELEVATION
E-3 ○ W-2 MW-1 P-2	APPROXIMATE ABANDONED WELL LOCATION
— —	POTENTIOMETRIC SURFACE LINE

N

APPROXIMATE SCALE
0 600'
FEET

J:\14323\CIV\CL003

PHILIP
ENVIRONMENTAL

NO.	REVISION	BY	APPR.	DATE
1	REVISED LOCATION OF WELLS MW-6, P-7, P-10 & P-11	M.R.W.		6/4/96

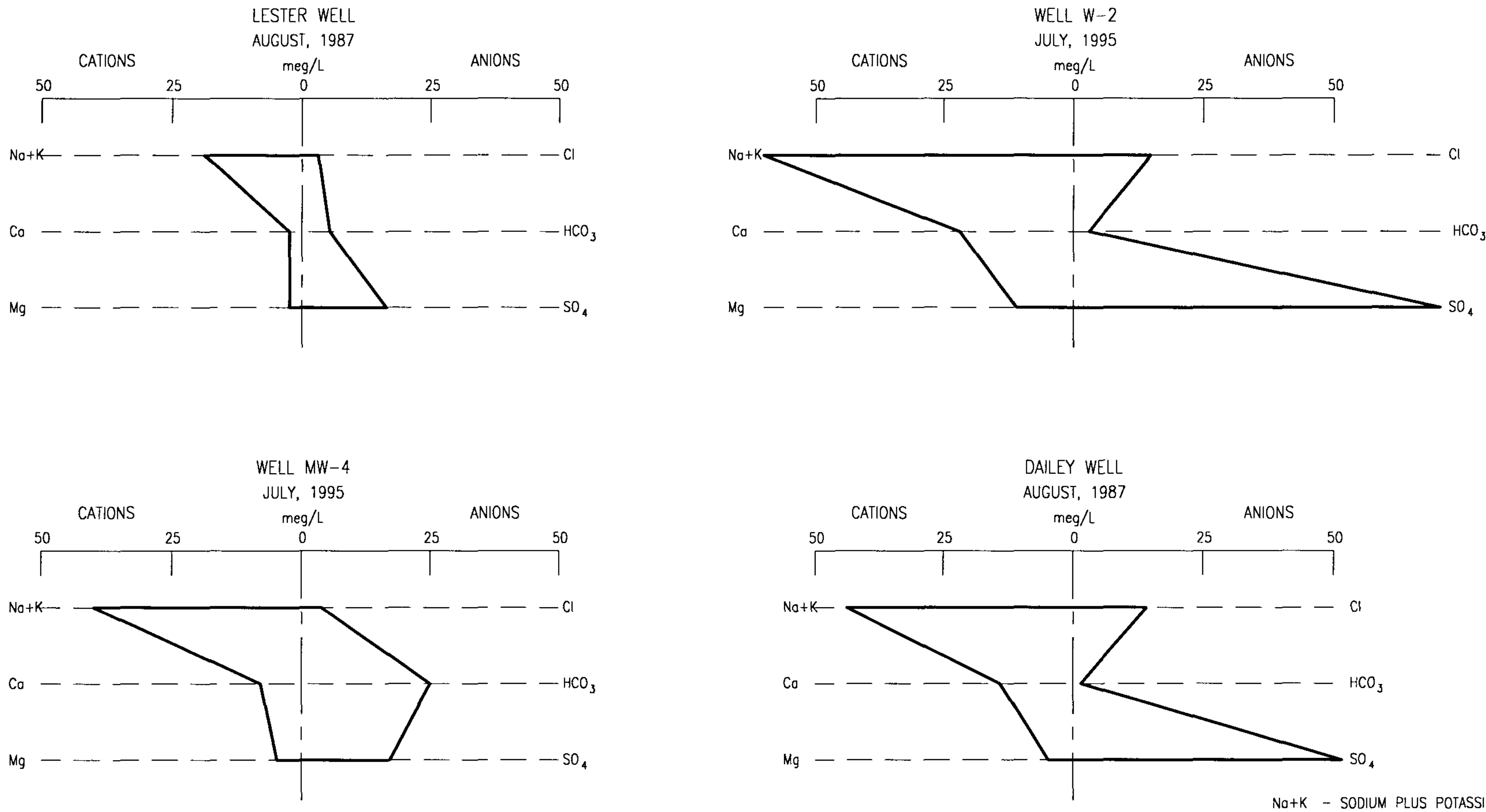
TITLE:
POTENTIOMETRIC SURFACE MAP - JULY 18, 1995
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

SCALE	AS NOTED	DATE
DWN:	M.R.W.	4/16/96
DES:		
CHKD:		
APPD:		

PROJECT NO: 14323
EL PASO NATURAL GAS COMPANY

FIGURE 6
REV: 1

COL. J:\14323\CIV\CL003



Na+K - SODIUM PLUS POTASSIUM
Ca - CALCIUM
Mg - MAGNESIUM
Cl - CHLORIDE
HCO_3 - CARBONATE
SO_4 - SULFATE

NOTE: meg/L = MILLI EQUIVALENT PER LITER

J:\14323\CIV\CL004

PHILIP
ENVIRONMENTAL

NO.	REVISION	BY	APPR.	DATE
A	ISSUED FOR APPROVAL	M.R.W.		4/16/96

TITLE:
STIFF DIAGRAM - LOCAL WELLS, W2 & MW-4
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

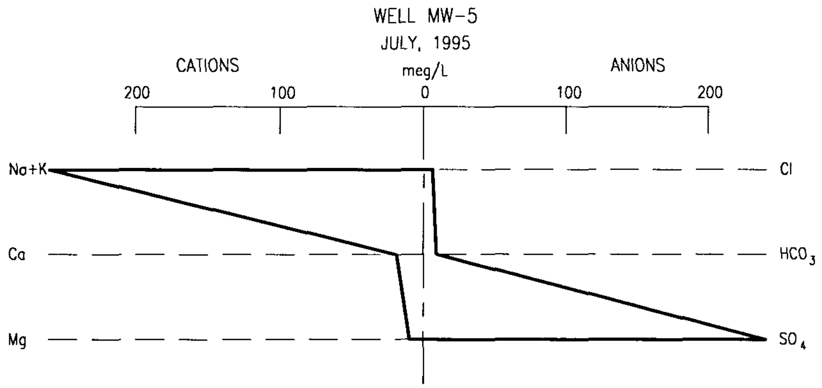
		DATE
SCALE	NONE	
DWN:	M.R.W.	4/16/96
DES:		
CHKD:		
APPD:		

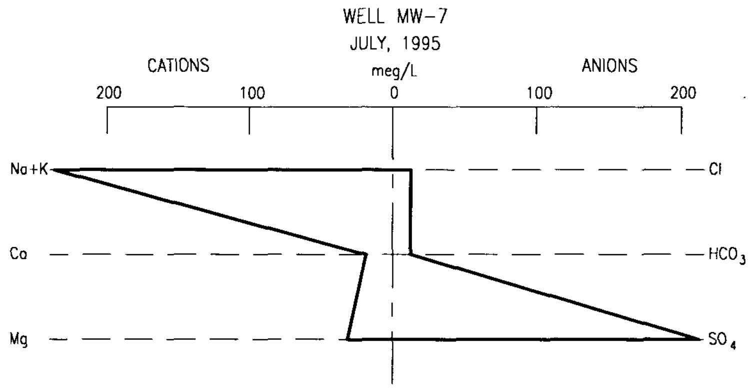
PROJECT NO: 14323
EL PASO NATURAL
GAS COMPANY

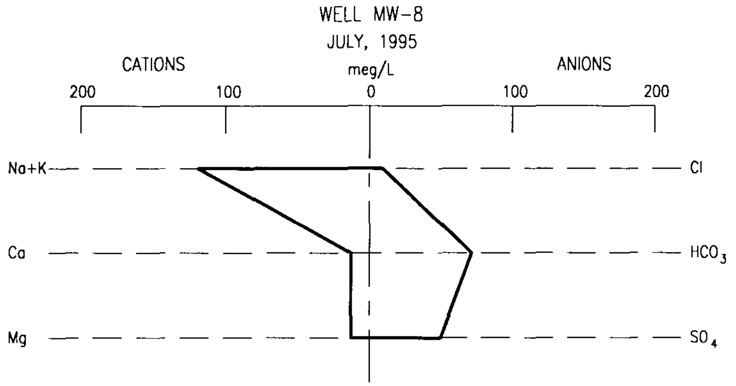
FIGURE 7

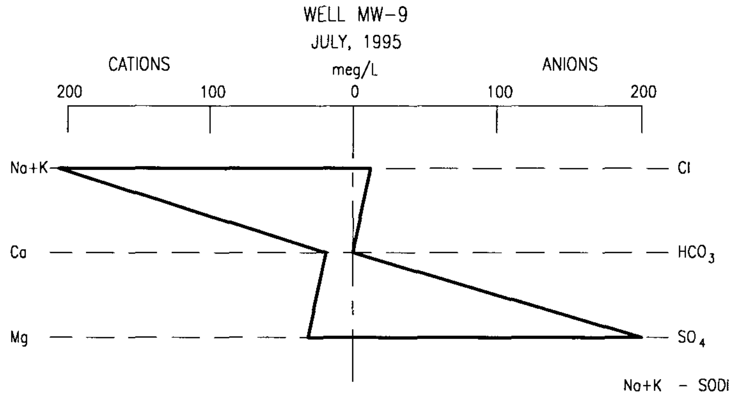
REV.
A

COL. J:\14323\CIV\CL004









NOTE: meg/L = MILLI EQUIVALENT PER LITER

Na+K - SODIUM PLUS POTASSIUM
Ca - CALCIUM
Mg - MAGNESIUM
Cl - CHLORIDE
HCO_3 - CARBONATE
SO_4 - SULFATE

J:\14323\CIV\CL005

PHILIP
ENVIRONMENTAL

NO.	REVISION	BY	APPR.	DATE
A	ISSUED FOR APPROVAL	M.R.W.		4/16/96

TITLE:
STIFF DIAGRAM - WELLS MW-5, 7, 8, & 9
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

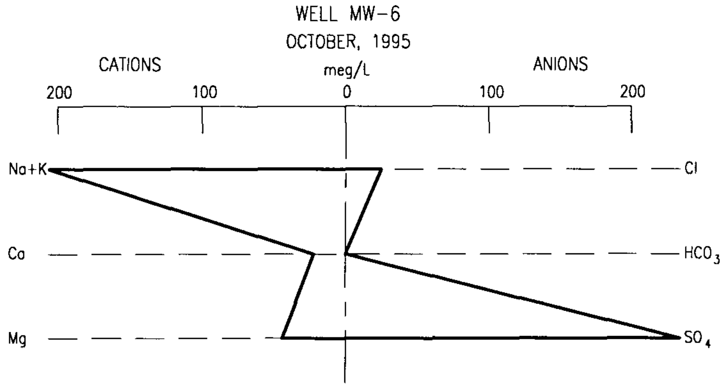
		DATE
SCALE	NONE	
DWN:	M.R.W.	4/16/96
DES:		
CHKD:		
APPD:		

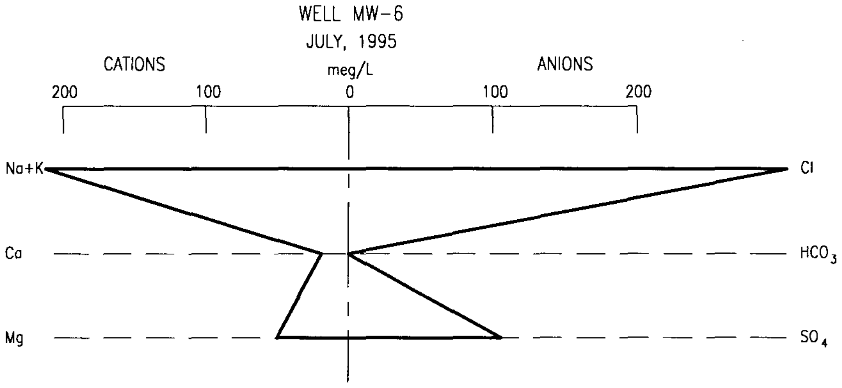
PROJECT NO: 14323
EL PASO NATURAL
GAS COMPANY

FIGURE 8

REV. A

COL. J:\14323\CIV\CL005





NOTE: meg/L = MILLI EQUIVALENT PER LITER

Na+K - SODIUM PLUS POTASSIUM
Ca - CALCIUM
Mg - MAGNESIUM
Cl - CHLORIDE
HCO_3 - CARBONATE
SO_4 - SULFATE

J:\14323\CIV\CL006

PHILIP ENVIRONMENTAL

NO.	REVISION	BY	APPR.	DATE
A	ISSUED FOR APPROVAL	M.R.W.		4/16/96

TITLE:
STIFF DIAGRAM - WELL MW-6
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

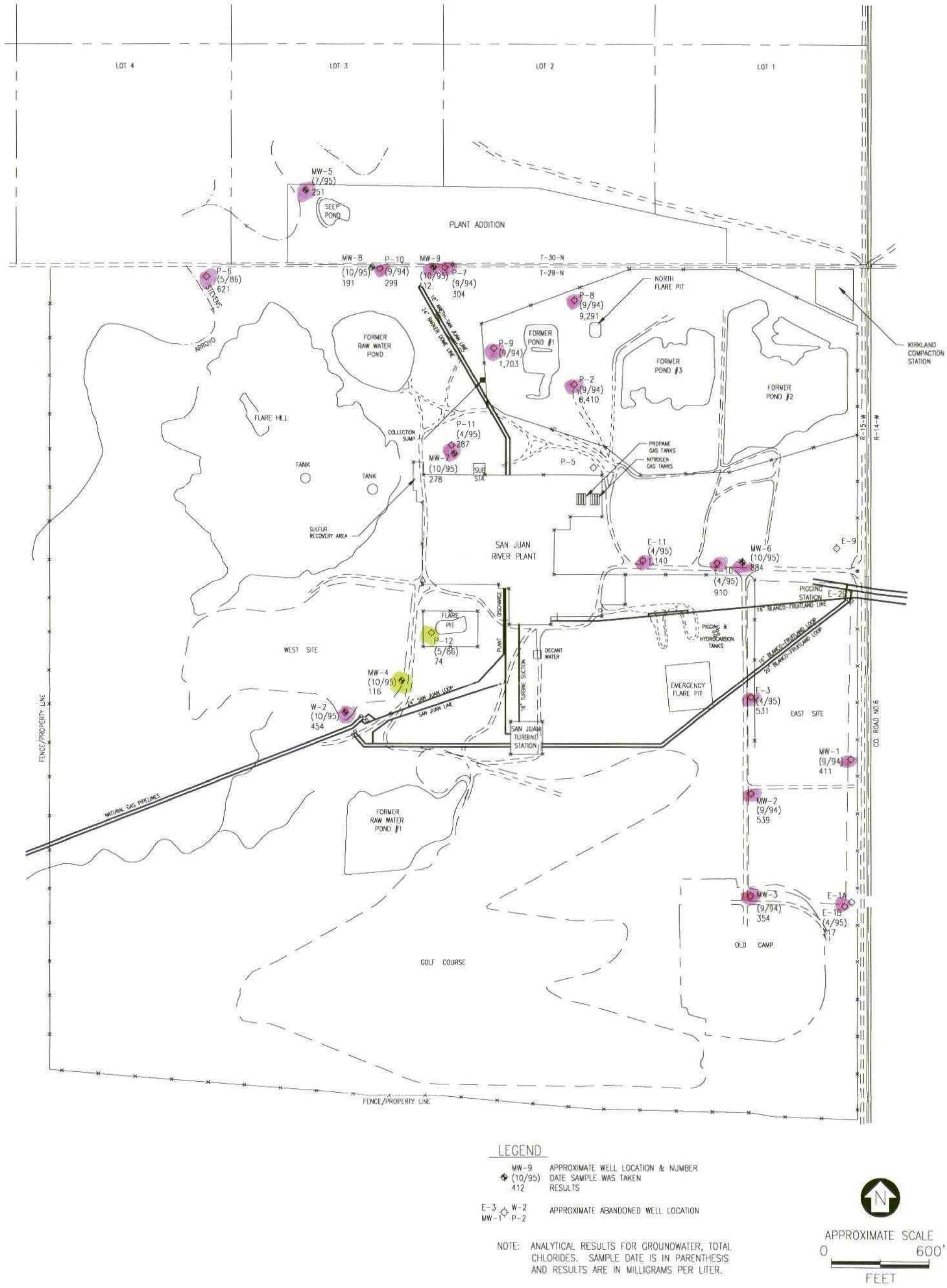
		DATE
SCALE	NONE	
DWN:	M.R.W.	4/16/96
DES:		
CHKD:		
APPD:		

PROJECT NO: 14323
EL PASO NATURAL
GAS COMPANY

FIGURE 9

REV.
A

COL. J:\14323\CIV\CL006



LEGEND

MW-9 (10/95) 412 — APPROXIMATE WELL LOCATION & NUMBER, DATE SAMPLE WAS TAKEN, RESULTS

E-3 MW-1 ○ W-2 P-2 — APPROXIMATE ABANDONED WELL LOCATION

NOTE: ANALYTICAL RESULTS FOR GROUNDWATER, TOTAL CHLORIDES. SAMPLE DATE IS IN PARENTHESIS AND RESULTS ARE IN MILLIGRAMS PER LITER.

J:\14323\CIV\CL0012-2

PHILIP
ENVIRONMENTAL

NO.	REVISION	BY	APPR.	DATE
2	REMOVED CHLORIDE CONTOURS	M.R.W.		12/16/96
1	REVISED LOCATION OF WELLS MW-6, P-7, P-10 & P-11	M.R.W.		6/4/96

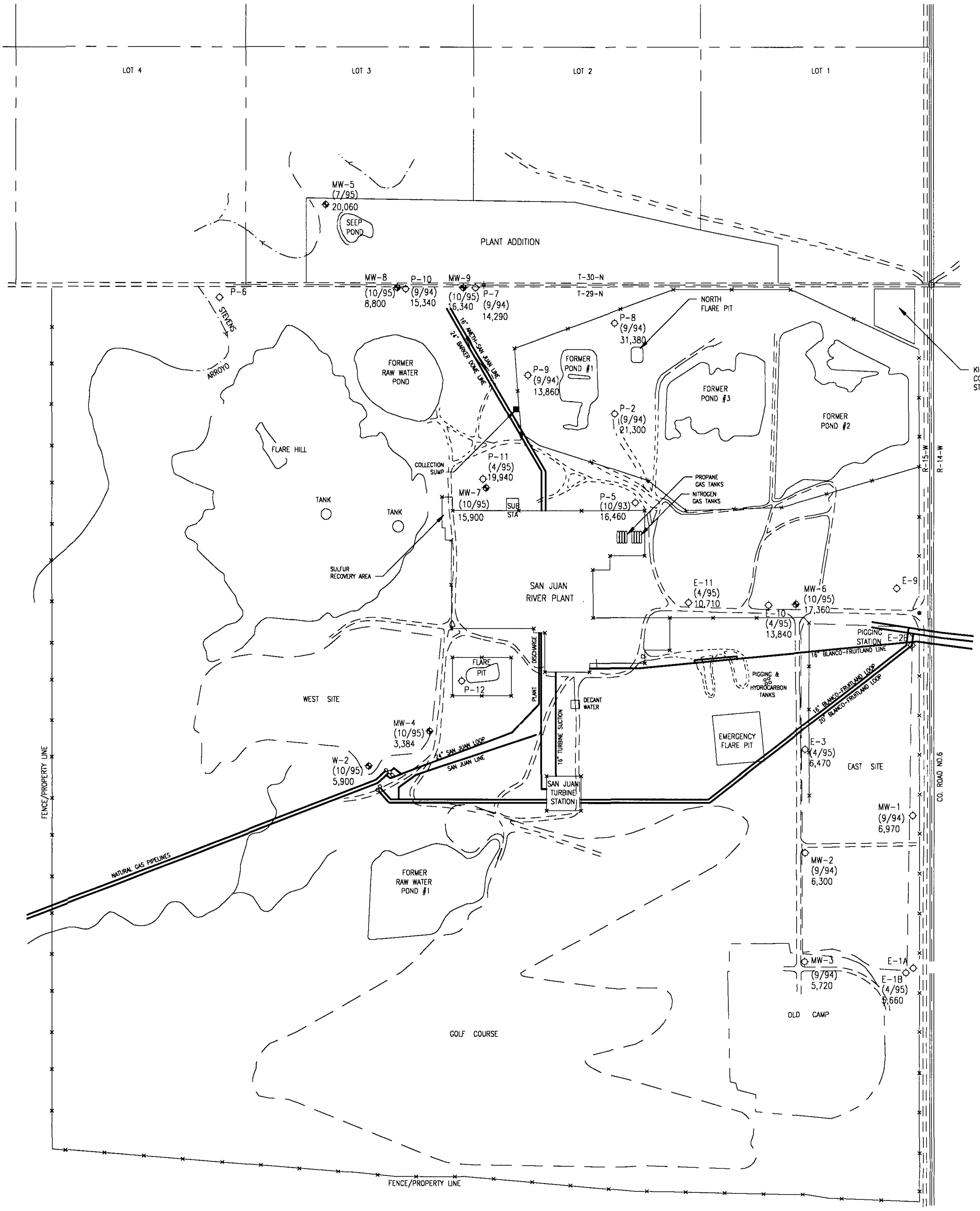
TITLE:
CHLORIDE IN GROUNDWATER
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

		DATE
SCALE	AS NOTED	
DWN:	M.R.W.	4/23/96
DES:		
CHKD:		
APPD:		

PROJECT NO: 14323
EL PASO NATURAL GAS COMPANY

FIGURE 10
REV: 2

COL. J:\14323\CIV\CL0012-2



LEGEND

	MW-9	APPROXIMATE WELL LOCATION & NUMBER
⯐	(10/95)	DATE SAMPLE WAS TAKEN
	16,340	RESULTS

NOTE: ANALYTICAL RESULTS FOR GROUNDWATER, TOTAL DISSOLVED SOILIDS. SAMPLE DATE IS IN PARENTHESIS AND RESULTS ARE IN MILLIGRAMS PER LITER.

N

APPROXIMATE SCALE
0 600'
FEET

J:\14323\CIV\CL012-1

PHILIP
ENVIRONMENTAL

NO.	REVISION	BY	APPR.	DATE
⚠1	REVISED LOCATION OF WELLS MW-6, P-7, P-10 & P-11	M.R.W.		6/4/96

TITLE:

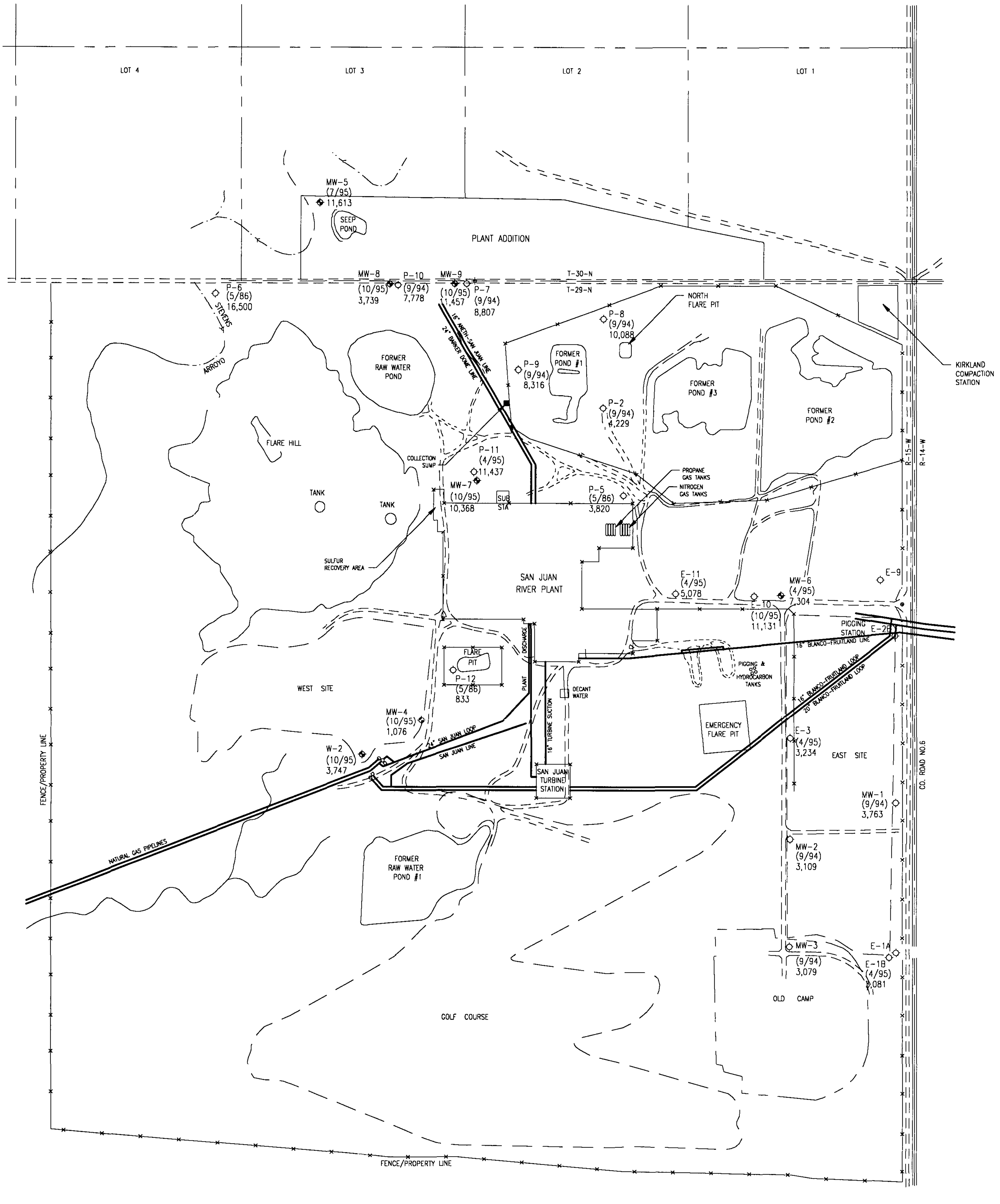
TOTAL DISSOLVED SOLIDS IN GROUNDWATER
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

SCALE	AS NOTED	DATE
DWN:	M.R.W.	4/16/96
DES:		
CHKD:		
APPD:		

PROJECT NO: 14323
EL PASO NATURAL GAS COMPANY

FIGURE 11
REV: 1

COL. J:\14323\CIV\CL012-1



LEGEND

MW-8	APPROXIMATE WELL LOCATION & NUMBER
(10/95)	DATE SAMPLE WAS TAKEN
3,739	RESULT

NOTE: ANALYTICAL RESULTS FOR GROUNDWATER, TOTAL SULFATES. SAMPLE DATE IS IN PARENTHESIS AND RESULTS ARE IN MILLIGRAMS PER LITER.

N

APPROXIMATE SCALE
0 600'
FEET

J:\14323\CIV\CL0012-3

PHILIP
ENVIRONMENTAL

NO.	REVISION	BY	APPR.	DATE
1	REVISED LOCATION OF WELLS MW-6, P-7, P-10 & P-11	M.R.W.		6/4/96

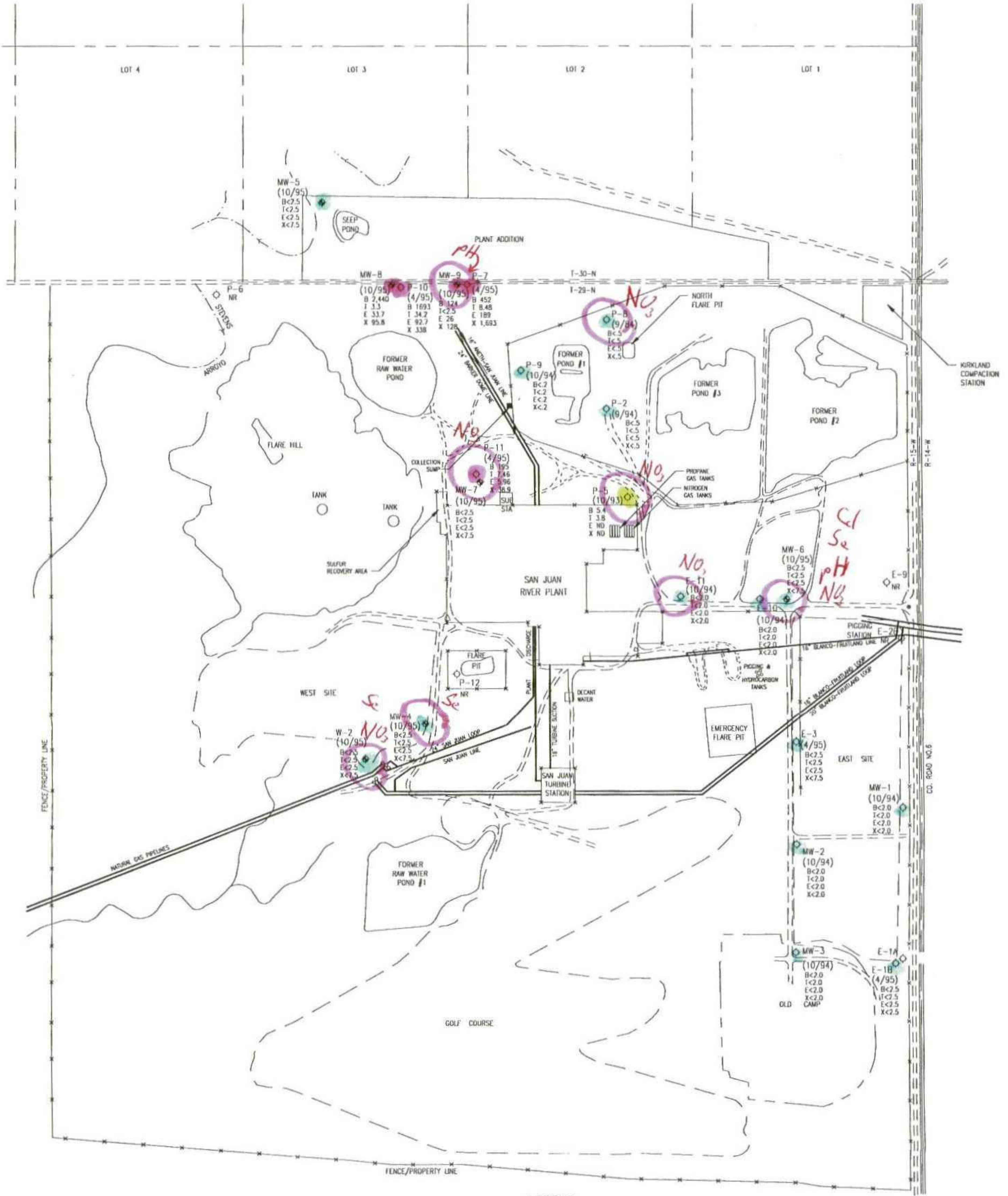
TITLE:
SULFATE IN GROUNDWATER
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

SCALE: AS NOTED
DWN: M.R.W. DATE: 4/16/96
DES:
CHKD:
APPD:

PROJECT NO: 14323
EL PASO NATURAL GAS COMPANY

FIGURE 12
REV: 1

COL. J:\14323\CIV\CL0012-3



LEGEND

MW-9	APPROXIMATE WELL LOCATION & NUMBER
(10/95)	DATE SAMPLE WAS TAKEN
B 124	- BENZENE, (ug/L)
T<2.5	- TOLUENE, (ug/L)
E 26	- ETHYL BENZENE, (ug/L)
X 128	- XYLENES, (ug/L)
ND	- NON DETECTED
ug/L	- MICROGRAMS /LITER
NR	- NO RESULTS

N

APPROXIMATE SCALE
0 600'
FEET

J:\14323\CIV\CL013

PHILIP
ENVIRONMENTAL

NO.	REVISION	BY	APPR.	DATE
1	REVISED LOCATION OF WELLS MW-6, P-7, P-10 & P-11	M.R.W.		6/4/96

TITLE:
BTEX CONCENTRATIONS IN GROUNDWATER
SAN JUAN RIVER PLANT
KIRTLAND, NEW MEXICO

SCALE: AS NOTED
DWN: M.R.W.
DES:
CHKD:
APPD:
DATE: 4/18/96

PROJECT NO: 14323
EL PASO NATURAL GAS COMPANY

FIGURE 13
REV: 1

COL. J:\14323\CIV\CL013

APPENDIX A

RECORD OF SUBSURFACE EXPLORATION FORMS

RECORD OF SUBSURFACE EXPLORATION

Borehole # MW-5
Well # MW-5
Page 1 of 1

Philip Environmental Services Corporation
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Project Name EPNG San Juan River Plant
Project Number 14323 Phase 3003
Project Location Kirtland, New Mexico

Elevation 5257.44 Feet MSL
Borehole Location
GWL Depth
Logged By Allen S. Hains
Drilled By Philip Environmental
Date/Time Started 6-26-95 10:30
Date/Time Completed 6-26-95 14:30

Well Logged By Allen S. Hains
Personnel On-Site Mike Donohue
Contractors On-Site James O'Keefe
Client Personnel On-Site Kevin Sedlak

Drilling Method Hollow-Stem Auger
Air Monitoring Method Photoionization Detector

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU BZ	BH	S	Drilling Conditions & Blow Counts
0										
5	S-1	5'-7'	8"	Light Brown Silty Fine SAND, Loose, Dry			0	0	0	11:35
10	S-2	10'-12	7"	Dark Grey CLAY, Hard, Dry			0	0	0	11:40
15	S-3	15'-17	8"	Light Grey to Rust CLAY, Hard, Dry			0	0	14	11:55
20	S-4	20'-22	12"	Light Brown to Dark Grey Silty CLAY, Hard, Dry			0	0	1	12:10
25	S-5	25'-27	10"	Dark Grey CLAY, Very Hard, Dry			0	0	2	12:30
30	S-6	30'-32	12"	Light Grey CLAY, Hard, Dry			0	0	0	12:50
35	S-7	35'-37	3"	Light Grey CLAY, Very Hard, Dry to Moist			0	0	0	13:10
				Auger Refusal @ 38"						
40										

Comments: Borehole left open overnight. Water found in borehole next morning. S-6 sent to laboratory for chemical analyses.

Geologist Signature

RECORD OF SUBSURFACE EXPLORATION

Borehole # MW-6
Well # MW-6
Page 1 of 1

Philip Environmental Services Corporation
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Project Name EPNG San Juan River Plant
Project Number 14323 Phase 3003
Project Location Kirtland, New Mexico

Elevation 5304.84 Feet MSL
Borehole Location
GWL Depth
Logged By Allen S. Hains
Drilled By Philip Environmental
Date/Time Started 7-10-95 7:15
Date/Time Completed 7-10-95 9:15

Well Logged By Allen S. Hains
Personnel On-Site Mike Donohue
Contractors On-Site James O'Keefe
Client Personnel On-Site Kevin Sedlak

Drilling Method Hollow-Stem Auger
Air Monitoring Method Photoionization Detector

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: PPM			Drilling Conditions & Blow Counts
							BZ	BH	S	
0										
5	S-1	3'-5'	12"	Light Brown Fine Silty SAND, Soft, Dry			0	0	0	7:15
10	S-2	8'-10'	12"	Light Brown Fine Silty SAND, Firm, Dry			0	0	0	7:30
15	S-3	13'-15'	8"	Light Brown Fine Silty SAND, Firm, Dry			0	0	30	7:40
20	S-4	18'-20	10"	Light Brown Fine Silty SAND, Hard, Dry			0	0	58	7:55
25	S-5	23'-25	9"	Light Brown Fine Silty SAND, Hard, Dry			0	0	13	8:10
30	S-6	28'-30	9"	Light Grey Fine Silty SAND, Hard, Dry			0	0	0	8:25
35	S-7	33'-35	8"	Light Grey Fine Silty SAND, Hard, Dry to Moist			0	0	27	8:40
40	S-8	38'-40	10"	Light grey to Brown Fine Silty SAND, Hard, Dry			0	0	7	9:10
				Boring Terminated @ 43 feet.						

Comments: Sample S-4 sent to laboratory.

Geologist Signature

RECORD OF SUBSURFACE EXPLORATION

Borehole # MW-7
Well # MW-7
Page 1 of 1

Philip Environmental Services Corporation
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Project Name EPNG San Juan River Plant
Project Number 14323 Phase 3003
Project Location Kirtland, New Mexico

Elevation 5293.13 Feet MSL
Borehole Location
GWL Depth
Logged By Allen S. Hains
Drilled By Philip Environmental
Date/Time Started 6-30-95 7:45
Date/Time Completed 6-30-95 9:55

Well Logged By Allen S. Hains
Personnel On-Site Mike Donohue
Contractors On-Site James O'Keefe
Client Personnel On-Site Kevin Sedlak

Drilling Method Hollow-Stem Auger
Air Monitoring Method Photoionization Detector

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: PPM			Drilling Conditions & Blow Counts
							BZ	BH	S	
0										
5	S-1	3.5'- 5.5'	12"	Light Brown Silty Fine SAND, Medium Hard, Dry			0	0	0	8:00
10	S-2	8.5'- 10.5'	13"	Medium Brown to Green Silty Fine SAND, Hard, Dry			0	0	0	8:15
15	S-3	13.5'- 15.5'	6"	Medium Brown to Green Silty Fine SAND, Hard, Dry			0	0	0	8:45
20	S-4	18.5'- 20.5'	6"	Yellow to Grey Fine Silty SAND, Hard, Moist			0	0	0	9:15
25	S-5	23.5'- 25.5'	8"	Yellow to Grey Fine Silty SAND, Hard, Moist			0	0	0	9:30
30	S-6	28.5'- 30.5'	7"	Dark Grey to Green w/ Rust Colored Streaks Fine SAND, Hard, Dry			0	0	0	9:55
				Boring Terminated @ 31 feet.						
35										
40										

Comments:

Geologist Signature Allen S. Hains

RECORD OF SUBSURFACE EXPLORATION

Borehole # MW-8
Well # MW-8
Page 1 of 1

Philip Environmental Services Corporation
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Project Name EPNG San Juan River Plant
Project Number 14323 Phase 3003
Project Location Kirtland, New Mexico

Elevation 5259.94 Feet MSL
Borehole Location
GWL Depth
Logged By Allen S. Hains
Drilled By Philip Environmental
Date/Time Started 6-30-95 13:00
Date/Time Completed 6-30-95 14:30

Well Logged By Allen S. Hains
Personnel On-Site Mike Donohue
Contractors On-Site James O'Keefe
Client Personnel On-Site Kevin Sedlak

Drilling Method Hollow-Stem Auger
Air Monitoring Method Photoionization Detector

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: PPM			Drilling Conditions & Blow Counts
							BZ	BH	S	
0										
5	S-1	3.5'-5.5'	8"	Light Brown Fine Silty SAND, Hard, Dry			0	0	0	13:05
10	S-2	8.5'-10.5'	11"	Light Grey Fine Clayey SAND, Hard, Dry			0	4	58	13:45 Petroleum Odor
15	S-3	13.5'-15.5'	8"	Light Grey to Brown Fine Silty SAND, Hard, Dry			0	32	85	14:15 Petroleum Odor
20	S-4	18.5'-20.5'		Light Grey Fine SAND, Hard w/ Very Hard Stringers, Dry Boring Terminated @ 21 Feet			0	10	736	14:30
25										
30										
35										
40										

Comments: Soil sample S-3 (and dupilcate) and S-4 were sent ot the laboratory.

Geologist Signature

RECORD OF SUBSURFACE EXPLORATION

Borehole # MW-9
Well # MW-9
Page 1 of 1

Philip Environmental Services Corporation
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Project Name EPNG San Juan River Plant
Project Number 14323 Phase 3003
Project Location Kirtland, New Mexico

Elevation 5260.97 Feet MSL
Borehole Location
GWL Depth
Logged By Allen S. Hains
Drilled By Philip Environmental
Date/Time Started 7-10-95 13:00
Date/Time Completed 7-10-95 14:00

Well Logged By Allen S. Hains
Personnel On-Site Mike Donohue
Contractors On-Site James O'Keefe
Client Personnel On-Site Kevin Sedlak

Drilling Method Hollow-Stem Auger
Air Monitoring Method Photoionization Detector

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: PPM			Drilling Conditions & Blow Counts
							BZ	BH	S	
0										
5	S-1	3'-5'	6"	Dark Brown Fine Clayey SAND, Soft, Moist			0	0	767	13:10 Petroleum Odor
10	S-2	8'-10'	12"	Medium Grey to Brown Clayey SAND, Soft, Dry			0	0	737	13:20 Petroleum Odor
15	S-3	13'-15	14"	Medium Grey to brown Clayey SAND, Hard w/ Very Hard Stringers, Dry			0	0	10	13:35
20	S-4	18'-20	11"	Light Brown Fine Silty SAND, Hard, Dry Boring Terminated @ 22 Feet.			0	0	176	14:00
25										
30										
35										
40										

Comments:

Geologist Signature

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South Flare Pit Remediation and Closure Summary

San Juan River Plant is located in Kirtland, NM in Section 1, Township 29N, and Range 15W, San Juan County. El Paso Natural Gas Co. no longer owns the plant itself, but does have property located adjacent to the plant boundaries on both the north and south sides. The south flare pit is located immediately south of the plant yard as noted in the aerial photograph found in Section 4.

In September 1992, EPNG requested approval from NMOCD to proceed with the remediation and closure of the south flare pit. Approval was subsequently received (see section 5b), and closure activities commenced.

The original pit size was approximately 100' wide by 200' long. The pit was historically used for the flaring of plant liquids during upset conditions or for the disposal of liquids from plant vessels during operations and maintenance type activities.

Excavation activities commenced on 9/28/92. All contaminated soil was run through a screen apparatus that segregated large rocks (>1" diameter) from the excavated material. The rocks were stockpiled in a separate location from the contaminated soil.

A distinct gray-colored clay layer was encountered across the entire excavation. The layer was evident at approximately 15 feet below the original bottom of the pit. It appeared to dip gently to the south east and was significantly thicker in the center of the pit. Samples of the clay were collected and analyzed for BTXE and TPH. These analytical results may be found in Section 1b. The analyses indicate that this layer is preventing migration of contaminants to the alluvial aquifer which is approximately 46 feet below the surface. The entire pit was therefore excavated to the point at which this clay layer was found. Specific care was taken to avoid breaching the clay layer.

Water Seepage

Along the north-center to northwest corner of the pit excavation, water seepage was noted. The water appeared to be seeping into the excavation from the north wall, from a level above the clay layer. A total of approximately 240 bbls of water were pumped from the excavation. The water was transported to EPNG's oil/water separator located just north of Blanco Plant. A sample of the seepage water was collected and analyzed for general chemistry and BTXE. These results are located in section 1c.

The water which seeped into the pit appeared to be coming from a perched zone of limited aerial extent. As noted above, this water was encountered at approximately 25 feet below the ground surface (elevation of approximately 5260), just above the locally extensive clay layer. Monitor well MW-4 is located approximately 200 feet south of the pit and is screened in the alluvial aquifer. The water level in MW-4 was measured at 46.1 feet below the ground surface (elevation 5243) on December 1, 1992. Additionally, the flow of water was low and intermittent and appeared to be limited to one area of the pit wall.

Stockpile

Throughout the excavation activities, the contaminated soil was stockpiled onsite. The stockpile was sampled on a number of occasions throughout the project. The analytical results of the stockpile samples indicated little or no BTXE contamination and TPH values less than 10,000 ppm. Sample results of the stockpile can be found in Section 1d. Based on the contamination levels measured and related conversations held with the district NMOCD inspector, EPNG requested NMOCD approval to landfarm the contaminated material onsite. Approval was subsequently received as noted in Section 5d. The landfarm application will be discussed in more detail in Section 3. A total of 18,200 cubic yards were excavated from the south flare pit proper. Of that total, 3900 cubic yards represented the rocks that were screened out.

Exploratory Trenching

In order to determine the lateral extent of the contamination, seven exploratory trenches were excavated around the original pit. A drawing which depicts the location of each of the trenches in relation to the pit and the analytical results are located in Section 1e. The trenching revealed that contamination did exist out beyond the boundaries of the original pit. The contaminated layer, however, appeared to drastically reduce in thickness within approximately 50'. Because the layer of overburden that would need to be removed in order to excavate the contaminated soil was 15+ feet, it was left in place. This matter was discussed with NMOCD's district inspector.

Verification

After excavation of 18,000+ cubic yards of soil, and a review of the exploratory trenching had occurred, EPNG felt that excavation was at the point of practical extent. Excavation stopped and verification samples were secured. The pit floor was sampled according to the grid diagram shown in section 1f. Three samples were also collected from each of the pit walls. These represented grab samples taken from the top, middle, and bottom sections of each wall at locations which visually appeared to be the worst case. The verification sample results were analyzed for BTXE and TPH and can also be found in Section 1f. BTXE was not detected in any of the verification samples.

Backfill

The verification and trenching sample results were discussed with the district NMOCD inspector. It was then agreed that backfilling operations could be initiated. As noted earlier, we observed that the clay layer in the pit bottom was quite thick in the center. This clay "hump" was therefore spread out over the entire pit bottom which allowed us to leave at a minimum, a 4' layer of clay in the pit bottom. Then, to optimize the operation, the next step was to push the pit walls in towards the center of the pit. As an added measure, more samples were secured after each wall was pushed in. These samples represent a composite picture of sorts for each wall. The analytical results are located in Section 1g.

All backfill soil was acquired through Arco, a local gravel company. As specified in the original closure plan (Section 5a), the rocks that were originally segregated from the contaminated soil were also used to backfill the hole. The rocks were returned to the excavation intermittently with the backfill soil. This was to avoid creating a single, solid layer of rocks. The final phase of the backfilling operation involved the installation of a 2' cap over the entire excavated area. This was to account for settling and to prevent ponding.

Verification Summary - January 15, 1992
FIELD SERVICES LABORATORY ANALYTICAL RESULTS
SAN JUAN RIVER PLANT - SOUTH FLARE PIT

							EPA Met. 8020 (BTEX) (MG/KG)				
Sample Number	Sample Location	Sample Description	Time	Date (MM/DD/YY)	IR TPH Mod. 418.1 (MG/KG)	C6-C36 TPH Mod. 8015 (MG/KG)	B	T	E	X	TCLP Metals
N22316	Bottom of Pit - 10 Foot, South Wall	Gray, Clay	1212	10/02/92	280	<5	<.025	<.025	<.025	<.025	NR
N22317	Background Soil	Brown: Sandy	1220	10/02/92	118	79	<.025	<.025	<.025	<.025	NR
N22460	Trench #1 - 15 Foot	Grey: Clay	1600	10/19/92	<10	NR	NR	NR	NR	NR	NR
N22462	Trench #2	Grey: Clay	1400	10/19/92	<10	NR	NR	NR	NR	NR	NR
N22463	Trench #3	Grey: Clay	1500	10/19/92	<10	NR	NR	NR	NR	NR	NR
N22464	Trench #4	Grey: Clay	900	10/20/92	65	NR	NR	NR	NR	NR	NR

Note: NR = Not Run

EL PASO
NATURAL GAS COMPANY

MEMORANDUM

TO: Sandra Miller

DATE: October 19, 1992

FROM: John Lambdin

PLACE: Field Services
Engineering Laboratory

Subject: San Juan River Plant, South Flare Pit, Seep Water Results

On October 13, 1992 the Field Services lab collected one aqueous sample for general chemistry and BETX analysis from the West Pit at the referenced location. The sample was assigned the laboratory number N22379. Attached are the results of our testing.

Please let me know, if you have any questions.

John Lambdin

John Lambdin

cc: Results Log Book
File
David Hall

Attachments:

EL PASO NATURAL GAS COMPANY
FIELD SERVICES LABORATORY – WATER ANALYSIS

LOCATION: San Juan River Plant
SOURCE: South Flare Pit Excavation
DATE OF SAMPLE: 10-13-92
SAMPLED BY: Dennis Bird

PROJECT: SJRP SFP
SAVE FILE: N22379
REPORT DATE: Oct. 19, 1992

SAMPLE POINT	West Pit Seep Water			
LAB ID #	N22379			
pH	7.54			
ALKALINITY AS CO3	0			
ALKALINITY AS HCO3	1903			
CALCIUM AS Ca	88			
MAGNESIUM AND Mg	96			
TOTAL HARDNESS AS CaCO3	615			
CHLORIDE AS Cl	101			
SULFATE AS SO4	1205			
SILICA AS SiO2	45			
FLUORIDE AS F	19			
POTASSIUM AS K	22			
TOTAL DISSOLVED SOLIDS	1980			
CONDUCTIVITY (umhos)	2820			
SODIUM (ACTUAL)	256			
NITRATE as NO3–N	4.4			
Ammonium as NH4	392			
Iron as Fe ~~(Note 1)~~ DJ 10/19/92	Not Tested			
Phosphate as PO4	12			
Nitrite as NO2–N	Trace			
Bromide as Br	Trace			

–– All Results expressed as ppm or umhos ––

REMARKS:

Hydrocarbons were present in this sample.
ND = None Detected.
Trace is <10 ppm.

Teresa White 10/19/92
Analyst Date

10/19/92
Lab Superintendent Date

EL PASO NATURAL GAS COMPANY
FIELD SERVICES LABORATORY
ANALYTICAL REPORT
EPA METHOD 8020 – BETX

SAMPLE IDENTIFICATION

SAMPLE NUMBER: **N22379**

SAMPLE DATE: 10–13–92
SAMPLE TIME (Hrs.): 1405
SAMPLED BY: Dennis Bird
LOCATION: San Juan River Plant
SAMPLE SITE: South Flare Pit
SAMPLE POINT: West Pit, Seep Water
DATE OF ANALYSIS: 10–19–92

REMARKS: This was not a valid sample because it was not properly preserved and was collected in a plastic container. Results are only crude estimates.

RESULTS

PARAMETER	PPB (ug/L)	QUALIFIER	COMMENTS
BENZENE	58.4	J	This value is an estimate.
ETHYLBENZENE	<10.0	B	The result is below the detection level.
TOLUENE	10.4	J	This value is an estimate.
TOTAL XYLENES	<10.0	B	The result is below the detection level.

Approved By: 10/19/92
Date

El Paso Natural Gas Company

CHAIN OF CUSTODY RECORD

Project No.:

Project Name: SAN JUAN SOUTH FLARE PIT

Samplers: (Signature) Dennis Bird

Date: 10-13-92

Receiving Temp. (°F):

Contract Laboratory:
EL PASO NATURAL GAS
770 WEST NAVAJO
FARMINGTON N.M.

Lab ID	Date	Time	Matrix	Sample Number	Total No. of Containers	Chain of Custody Seals	Intact?	Composite or Grab	See Attached	GENERAL CHEMISTRY	BETX		Remarks
	10-13-92	1405	WATER	N22379						X	+		WATER ABOVE CLAY

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Dennis Bird	10-13-92				

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks:
		Teresa White	10/19/92 1600	

Results & Invoices to::

Charge Code

Date Results Reported / by: (Signature)

WHITE-Testing Laboratory **YELLOW**-EPNG Lab **PINK**-Field Sampler

san juan repro Form 71-65

Verification Summary - January 15, 1992
FIELD SERVICES LABORATORY ANALYTICAL RESULTS
SAN JUAN RIVER PLANT - SOUTH FLARE PIT

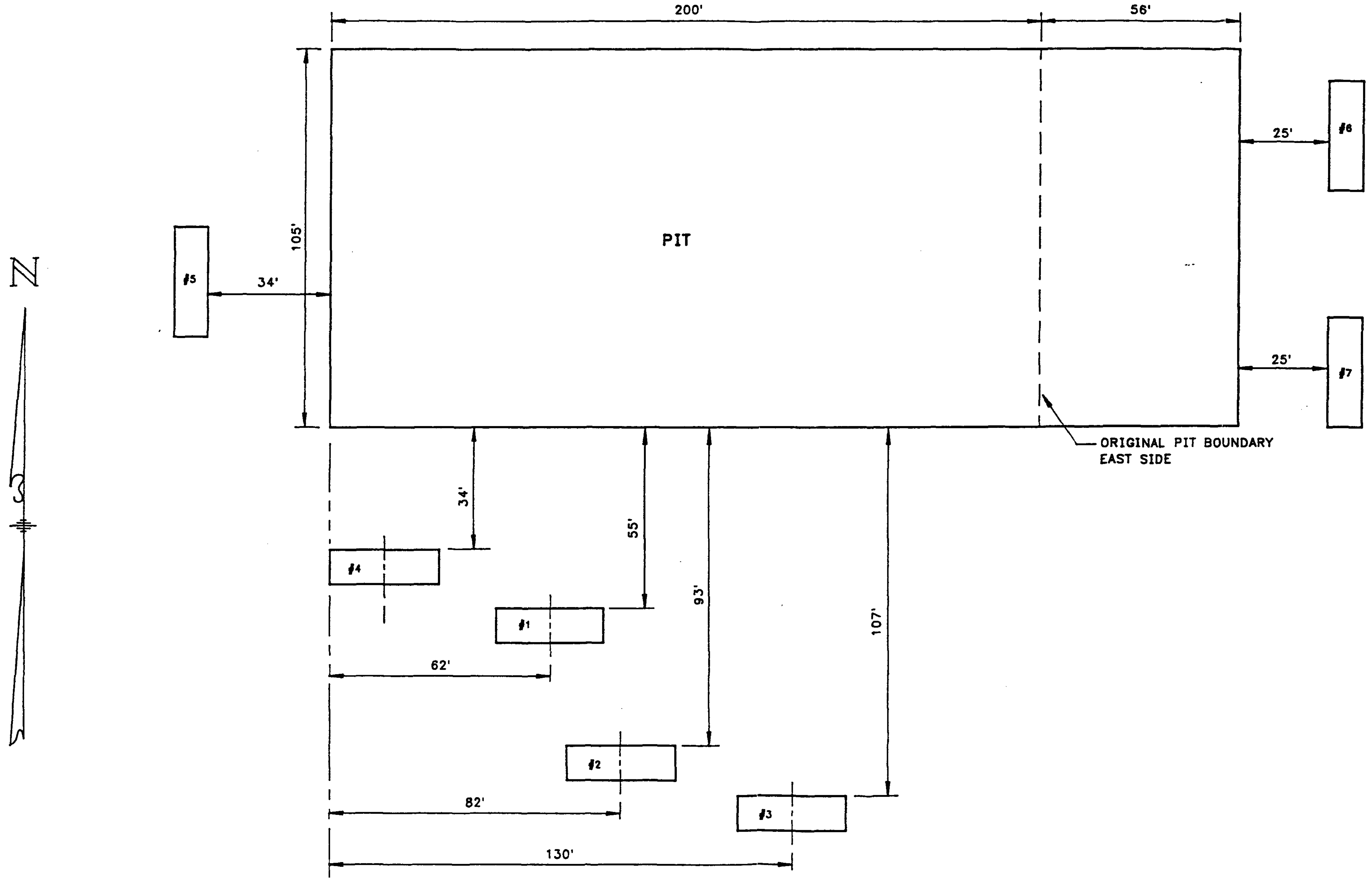
Sample Number	Sample Location	Sample Description	Time	Date (MM/DD/YY)	IR TPH Mod. 418.1 (MG/KG)	C6-C36 TPH Mod. 8015 (MG/KG)	EPA Met. 8020 (BTEX) (MG/KG)				TCLP Metals
							B	T	E	X	
N22302	Background Soil	Brown: Sandy	913	09/29/92	177	15	<.025	<.025	<.025	<.025	Pass
N22306	Main Soil Pile, North - Bottom	Black/Gray Sand	1530	09/30/92	>10,000	6400	<.025	0.1	0.049	0.5	NR
N22307	Main Soil Pile, Middle- Bottom	Black/Gray Sand	1535	09/30/92	>10,000	6954	0.028	0.13	0.058	0.49	NR
N22308	Main Soil Pile, South - Bottom	Black/Gray Sand	1540	09/30/92	>10,000	7352	<.025	0.049	0.032	0.26	NR
N22310	North Pile side 1 - Core	Gray, Fine Sand	1048	10/02/92	>5,000	3400	<.025	<.025	<.025	0.03	NR
N22311	North Pile side 2 - Core	Gray, Fine Sand	1100	10/02/92	>10,000	5600	<.025	<.025	0.026	0.2	NR
N22312	Middle Pile side 1 - Core	Gray, Fine Sand	1113	10/02/92	>10,000	6500	<.025	<.025	<.025	0.1	NR
N22313	Middle Pile side 2 - Core	Gray, Fine Sand	1125	10/02/92	>10,000	8200	<.025	0.028	0.091	0.59	NR
N22314	South Pile side 1 - Core	Gray, Fine Sand	1142	10/02/92	>10,000	7000	<.025	<.025	0.027	0.15	NR
N22315	South Pile side 2 - Core	Gray, Fine Sand	1152	10/02/92	>10,000	7100	<.025	0.027	0.079	0.46	NR
N22370	Top of Pile	Brown: Grey Chks.	1332	10/13/92	2366	NR	NR	NR	NR	NR	NR
N22371	6 Inches from Top of Pile	Brown: Chunks	1335	10/13/92	>5,000	NR	NR	NR	NR	NR	NR

NOTES:
NR = Not Run, Sample Problems: Not enough, too wet, etc.

Verification Summary - January 15, 1992
FIELD SERVICES LABORATORY ANALYTICAL RESULTS
SAN JUAN RIVER PLANT - SOUTH FLARE PIT

Sample Number	Sample Location	Sample Description	Time	Date (MM/DD/YY)	IR TPH Mod. 418.1 (MG/KG)	C6-C36 TPH Mod. 8015 (MG/KG)	EPA Met. 8020 (BTEX) (MG/KG)				TCLP Metals
							B	T	E	X	
N22459	Trench #1 - 13 Foot	Brown: Chunks	1545	10/19/92	<10	NR	NR	NR	NR	NR	NR
N22460	Trench #1 - 15 Foot	Grey: Clay	1600	10/19/92	<10	NR	NR	NR	NR	NR	NR
N22461	Trench #1 - 17 Foot	Brown: Sand	1630	10/19/92	382	NR	NR	NR	NR	NR	NR
N22462	Trench #2	Grey: Clay	1400	10/19/92	<10	NR	NR	NR	NR	NR	NR
N22463	Trench #3	Grey: Clay	1500	10/19/92	<10	NR	NR	NR	NR	NR	NR
N22464	Trench #4	Grey: Clay	900	10/20/92	65	NR	NR	NR	NR	NR	NR
N22465	Trench #5	Black	930	10/20/92	<10	NR	NR	NR	NR	NR	NR
N22466	Trench #6	Black	1000	10/20/92	945	NR	NR	NR	NR	NR	NR
N22467	Trench #7	Clumpy Fine Sand	1025	10/20/92	<10	NR	NR	NR	NR	NR	NR

Note: NR = Not Run



PRT	SEP	DATE	TO	WO
PRINT RECORD				

ENG REC		DATE
DRAWN	MD	10/21/92
CHECK		
CHECK		
PROJ.		
DESIGN		
W.O.		

El Paso NATURAL GAS COMPANY

SAN JUAN RIVER PLANT
SOUTH FLARE PIT
REMEDIATION PROJECT (10/21/92)

SCALE 1"=30'
CGC NO. SJPIT
DWG. NO.
REV.

Verification Summary - January 15, 1992
FIELD SERVICES LABORATORY ANALYTICAL RESULTS
SAN JUAN RIVER PLANT - SOUTH FLARE PIT

							EPA Met. 8020 (BTEX) (MG/KG)				
Sample Number	Sample Location	Sample Description	Time	Date (MM/DD/YY)	IR TPH Mod. 418.1 (MG/KG)	C6-C36 TPH Mod. 8015 (MG/KG)	B	T	E	X	TCLP Metals
N22550	Grid Point # 1-1, N22521	Fine Dirt	1120	10/22/92	465	377	<.025	<.025	<.025	<.025	NR
N22551	Grid Point # 1-2, N22522	Clay	1125	10/22/92	1867	1030	<.025	<.025	<.025	<.025	NR
N22552	Grid Point # 1-3, N22523	Clay Dirt	1137	10/22/92	566	430	<.025	<.025	<.025	<.025	NR
N22553	Grid Point # 1-4, N22524	Rock Dirt	1145	10/22/92	132	660	<.025	<.025	<.025	<.025	NR
N22554	Grid Point # 2-1, N22525	Clay	1231	10/22/92	<10	9	<.025	<.025	<.025	<.025	NR
N22555	Grid Point # 2-2, N22526	Clay/Rock	1236	10/22/92	376	175/215	<.025	<.025	<.025	<.025	NR
N22556	Grid Point # 2-3, N22528	Clay	1241	10/22/92	3152	720	<.025	<.025	<.025	<.025	NR
N22557	Grid Point # 2-4, N22529	Clay	1246	10/22/92	34	35	<.025	<.025	<.025	<.025	NR
N22558	Grid Point # 3-1, N22530	Fine Sand	1253	10/22/92	801	580	<.025	<.025	<.025	<.025	NR
N22559	Grid Point # 3-2, N22531	Clay	1257	10/22/92	626	238	<.025	<.025	<.025	<.025	NR
N22560	Grid Point # 3-3, N22532	Clay	1301	10/22/92	<10	12/8	<.025	<.025	<.025	<.025	NR
N22561	Grid Point # 3-4, N22534	Clay	1308	10/22/92	<10	<5	<.025	<.025	<.025	<.025	NR
N22562	Background, N22535	Fine Sand	1315	10/22/92	4901	2220	<.025	<.025	<.025	<.025	NR
N22536	Background	Sand	1318	10/22/92	NR	<5	<.025	<.025	<.025	<.025	NR
N22537	East Wall - Top Layer	Sand	1325	10/22/92	NR	2800	<.025	<.025	<.025	<.025	NR
N22538	East Wall - Middle Layer	Sand	1327	10/22/92	NR	206	<.025	<.025	<.025	<.025	NR
N22539	East Wall - Bottom Layer	Sand	1329	10/22/92	NR	7100	<.025	<.025	<.025	0.12	NR
N22540	North Wall - Top Layer	Sand	1332	10/22/92	NR	480	<.025	<.025	<.025	<.025	NR
N22541	North Wall - Middle Layer	Sand	1335	10/22/92	NR	211	<.025	<.025	<.025	<.025	NR
N22542	North Wall - Bottom Layer	Sand	1337	10/22/92	NR	5600	<.025	<.025	<.025	<.025	NR
N22543	South Wall - Top Layer	Sand	1341	10/22/92	NR	46	<.025	<.025	<.025	<.025	NR
N22544	South Wall - Middle Layer	Sand	1343	10/22/92	NR	3190	<.025	<.025	<.025	0.03	NR
N22545	South Wall - Bottom Layer	Sand	1345	10/22/92	NR	1510	<.025	<.025	<.025	<.025	NR
N22546	West Wall - Top Layer	Sand	1350	10/22/92	NR	<5	<.025	<.025	<.025	<.025	NR
N22547	West Wall - Middle Layer	Sand	1353	10/22/92	NR	450	<.025	<.025	<.025	<.025	NR
N22548	West Wall - Bottom Layer	Sand	1355	10/22/92	NR	<5	<.025	<.025	<.025	<.025	NR

Note: NR = Not Run

El Paso
Natural Gas Company

MEMORANDUM

To: John Lambdin
Date: October 26, 1992
From: Dennis Bird
Place: Field Services Engineering-Lab

Subject: San Juan River South Flare Pit

On Thursday, October 22, 1992, I went to San Juan River to collect final vertification samples on the south flare pit. There were samples taken on the 3 different layers on each of the 4 walls. Samples were taken on the bottom of the pit at various locations. Attached is a drawing of the area that was sampled.

The soil was to be analyzed for Total Petroleum Hydrocarbons (TPH) and BTXE (Mod 8015/8020). The TPH will be by the EPA Method 418.1 Modified to accommodate soil samples. The samples were assigned the lab numbers N22521 to N22548. The field services laboratory will be analyzing for TPH. The samples for BTXE (Mod 8015/8020) were sent to analytical technologies Inc. in Phoenix, Arizona for analysis.

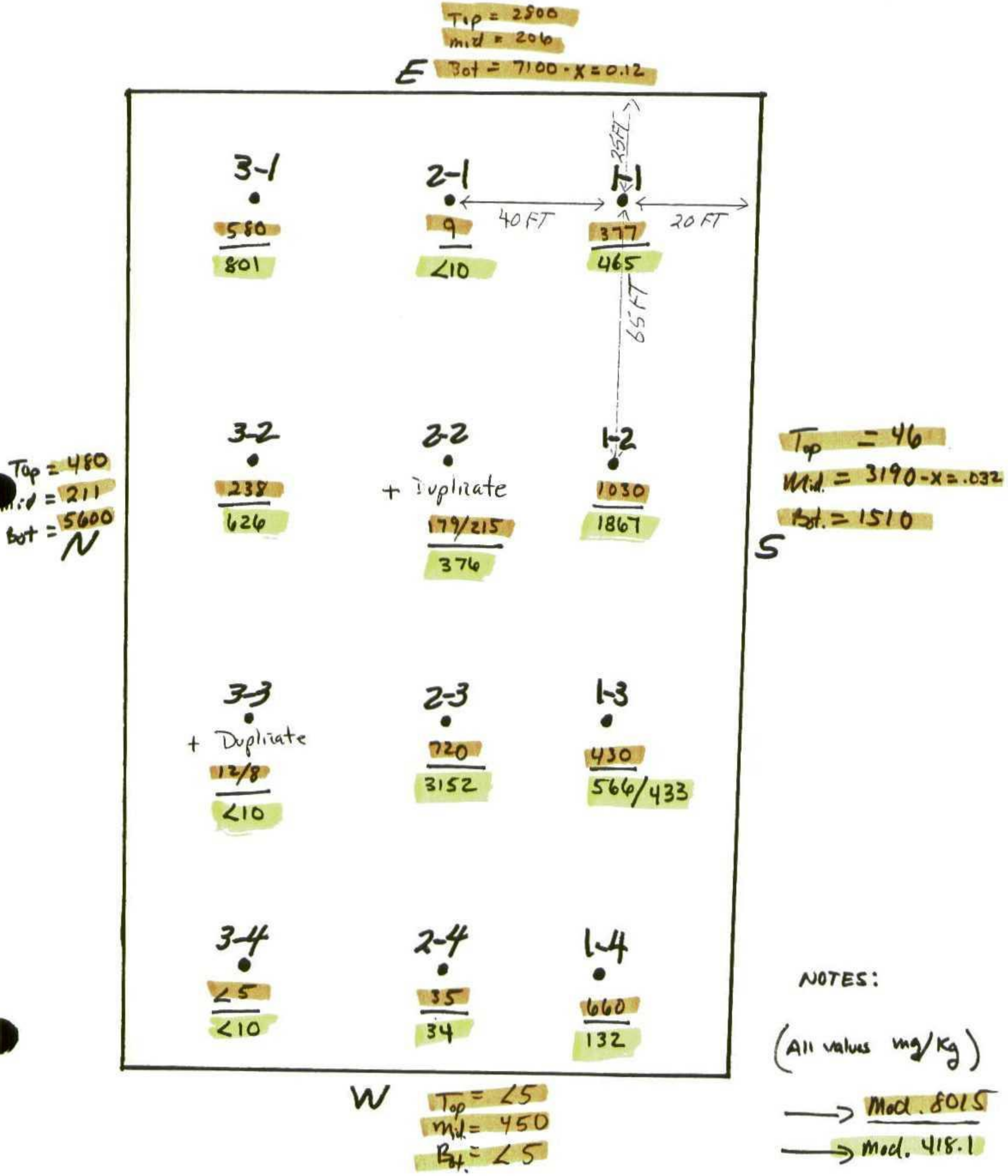
Should you have any question or comments, please let me know.

Dennis Bird
Dennis P. Bird

cc. Sandra Miller

SAN JUAN RIVER
SOUTH FLARE PIT
10-22-92

1 BKg = 2220/4901/5631
2 BKg = <5



North Flare Pit Remediation and Closure Summary

San Juan River Plant is located in Kirtland, NM in Section 1, Township 29N, and Range 15W, San Juan County. El Paso Natural Gas Co. no longer owns the plant itself, but does have property located adjacent to the plant boundaries on both the north and south sides. The north flare pit is located at the north edge of the wastewater pond area, between pond #1 and pond #3. The location of the flare pit is identified in the aerial photograph found in Section 4.

In September 1992, EPNG requested approval from NMOCD to proceed with the remediation and closure of the north flare pit. Approval was subsequently received as documented in section 5b. Closure activities commenced immediately following excavation activities at the south flare pit location.

The original pit size was approximately 50' wide by 75' long. The pit was historically used for the flaring of liquids associated with pigging and maintenance of the incoming field lines.

Excavation activities commenced on or near 10/29/92. Because the rock content was minimal, the contaminated soil was not screened as done at the south pit.

The pit was originally dug to an average depth of approximately 13'. The center of the pit was dug to approximately 16' because of higher TPH concentrations found there. A total of 3520 cubic yards of soil was excavated from the north flare pit.

Groundwater

Groundwater began seeping into the excavation near the 13' depth. Significant amounts of water seeped into the hole overnight. A total of approximately 100 bbls of water were pumped from the excavation. The water was transported to EPNG's oil/water separator located just north of Blanco Plant. A sample of the seepage water was collected and analyzed for general chemistry. The water was inadvertently not sampled for BTXE.

The results from the pit water, and the most recent sampling of monitor well P-8 are located in Section 2b. P-8 is located approximately 100' downgradient of the pit. It is completed to a depth of 30 feet. The water level measured in the well on December 1, 1992 was at 12.2 feet below the ground surface (elevation of approx. 5267). The elevation of the original pit bottom was surveyed at 5278.7 in 1982. This would mean that the water came in about 5265 fmsl. The monitor well appears therefore, to be monitoring the same interval that was encountered in the pit. The samples collected from this well indicate that contaminants are not migrating from the pit.

Stockpile

Throughout the excavation activities, the contaminated soil was stockpiled in immediate proximity to the pit. Several samples of the stockpiled soil were collected. The analytical results of the stockpile samples indicated little or no BTXE contamination and TPH values of around 5000. Sample results of the stockpile can be found in Section 2c. Because EPNG had already received approval to landfarm contaminated soil onsite, the soil was transferred to the landfarm for spreading.

Exploratory Trenching

In order to determine the lateral extent of the contamination, a trench was dug headed due south of the pit. The soil appeared very discolored with somewhat of an organic smell. The discolored soil was excavated and stockpiled separately from the actual pit soil. Samples of this stockpile were collected with the results showing no detectable TPH or BTXE. Results of this sampling effort are located in Section 2d. The results delineated the lateral extent on the south side.

Verification Samples

Because we had reached groundwater, EPNG, with concurrence from the district NMOCD inspector, decided to collect verification samples. The pit floor was sampled according the grid diagram shown in section 2e. Samples were also collected from each of the pit walls. These represented grab samples taken from points which visually appeared to be the worst case. The verification sample results were analyzed for BTXE and TPH and can also be found in Section 2e. BTXE levels were either not detected or well below clean up criteria of 50 ppm and 10 ppm for benzene.

Backfill

The verification sample results were discussed with the district NMOCD inspector. The backfilling operation was subsequently initiated. Backfill material was acquired from material onsite as noted in the original closure plan (Section 5a). This material appeared to be predominately a clay/shale type material. The final phase of the backfilling operation involved the installation of a 2' cap over the entire excavation area. This was to account for settling and to prevent ponding.

El Paso
Natural Gas Company

MEMORANDUM

TO: Sandra Miller

FROM: John Lambdin

DATE: Jan. 7, 1993

PLACE: Field Services
Engineering Laboratory

Subject: San Juan River Plant, North Flare Pit, Seep Water Results

On November 4, 1992 the Field Services lab collected one (1) water sample for general chemistry analysis from the remediation pit. The sample was assigned the laboratory number N22712 and analyzed for general chemistry components in accordance with EPA and APHA Standard Methods. This sample represents the groundwater which was seeping into the excavation during the remediation.

Attached you will find the results of our testing, COC and field sampling information.

Please let me know, if you have any questions.

John Lambdin
John Lambdin

cc: David Hall
Nancy Prince
Results Log Book
File

Attachments:

EL PASO NATURAL GAS CO. - NORTH REGION LAB - WATER ANALYSIS REPORT

LOCATION: SAN JUAN RIVER FLARE PIT PROJECT:
DATE OF SAMPLE: 11-04-92 SAVE FILE: N-22712
SAMPLED BY: R. BENSON

SAMPLE POINT	4' EAST OF SMPL.PT.2-3			
LAB ID #	N22712			
COMPLIANCE ID #				
pH	6.72			
ALKALINITY AS CO3	0			
ALKALINITY AS HCO3	569			
CALCIUM AS Ca	844			
MAGNESIUM AND Mg	443			
TOTAL HARDNESS AS CACO3	3931	0	0	0
CHLORIDE AS Cl	10735			
SULFATE AS SO4	8750			
SILICA AS SiO2	9			
FLUORIDE AS F	62			
POTASSIUM AS K	17			
SODIUM (CALCULATED)	9588	0	0	0
TOTAL DISSOLVED SOLIDS	30150			
CONDUCTIVITY (umhos)	32700			
SODIUM (ACTUAL)	9600			
IRON AS Fe (Dissolved)	1.90			
NITRATE AS NO3-N	3.74			

ARKS: -- All Results expressed as ppm or umhos --

Dennis Bird

Analyst

Lab Superintendent

EL PASO NATURAL GAS COMPANY
FIELD SERVICES LABORATORY
ANALYTICAL REPORT
EPA METHOD 8020 – BETX

SAMPLE IDENTIFICATION

SAMPLE NUMBER: N22993

SAMPLE DATE: 12-3-92
SAMPLE TIME (Hrs.): 1255
SAMPLED BY: Dennis Bird
LOCATION: San Juan River Plant
SAMPLE SITE: Monitor Well #P-8
SAMPLE POINT: Monitor Well Casing
DATE OF ANALYSIS: December 9, 1992

REMARKS:

RESULTS

PARAMETER	PPB (ug/L)	QUALIFIER	COMMENTS
BENZENE	<10		
ETHYLBENZENE	<10		
TOLUENE	<10		
TOTAL XYLENES	<10		

Approved By: ______________ 12/21/92
Date

QUALITY CONTROL REPORT
EPA METHOD 8020 – BETX
Samples: N22986 to N22997

LABORATORY DUPLICATES:

SAMPLE NUMBER N22988	TYPE	SAMPLE RESULT (S) (PPB)	DUPLICATE RESULT (D) (PPB)	RPD	ACCEPTABLE RANGE + / – 25%	
					YES	NO
Benzene	2nd Run	<10	<10	0.0	X	
Ethylbenzene	2nd Run	388	391	0.8	X	
Toluene	2nd Run	225	229	0.0	X	
Total Xylenes	2nd Run	941	962	2.2	X	

Narrative: Acceptable!

FIELD DUPLICATES:

SAMPLE NUMBER N22991/N22992D	TYPE	SAMPLE RESULT (S) (PPB)	DUPLICATE RESULT (D) (PPB)	RPD	ACCEPTABLE RANGE + / – 25%	
					YES	NO
Benzene	2nd VOA Vial	<10	<10	0.0	X	
Ethylbenzene	2nd VOA Vial	<10	<10	0.0	X	
Toluene	2nd VOA Vial	<10	<10	0.0	X	
Total Xylenes	2nd VOA Vial	<10	<10	0.0	X	

Narrative: Acceptable!

LABORATORY SPIKES:

SAMPLE NUMBER N22986	SPIKE ADDED (SA) PPB	SAMPLE RESULT (S) (PPB)	SPIKE SAMPLE RESULT (SR) (PPB)	%R	ACCEPTABLE RANGE 75–125 %R	
					YES	NO
Benzene	20.0	5.4	23.9	93	X	
Ethylbenzene	20.0	1.2	22.1	105	X	
Toluene	20.0	0.0	23.7	119	X	
Total Xylenes	40.0	3.1	46.4	108	X	

Narrative: Acceptable!

LABORATORY AND TRIP BLANKS:

SAMPLE ID	SOURCE	Component (PPB)	STATUS
Benzene	EPNG Water	<10	ACCEPTABLE
Ethylbenzene	EPNG Water	<10	ACCEPTABLE
Toluene	EPNG Water	<10	ACCEPTABLE
Total Xylenes	EPNG Water	<10	ACCEPTABLE

Narrative: Acceptable!

Approved By: 12/22/92
Date

Verification Summary - January 18, 1993
FIELD SERVICES LABORATORY ANALYTICAL RESULTS
SAN JUAN RIVER PLANT - NORTH FLARE PIT

Sample Number	Sample Location	Sample Description	Time	Date (MM/DD/YY)	IR TPH Mod. 418.1 (MG/KG)	C6-C36 TPH Mod. 8015 (MG/KG)	EPA Met. 8020 (BTEX) (MG/KG)				TCLP Metals
							B	T	E	X	
N22645	Stock Pile, S.E. Corner	Clay Sand	1020	10/27/92	1630	891	<.025	0.056	0.086	0.67	Pass
N22646	Stock Pile, N.E. Corner	Clay Sand	1033	10/27/92	4845	4981	<.025	0.64	0.69	6.5	Pass
N22647	Stock Pile, S.W. Corner	Sand	1049	10/27/92	7005	5000	0.052	0.44	0.89	6.4	Pass
N22648	Stock Pile, N.W. Corner	Sand	1104	10/27/92	5673	2956	<.025	0.052	0.16	1.0	Pass
N22652	Background	Fine Sand Some Rock Very Fine	1146	10/27/92	<10	NR	NR	NR	NR	NR	NR

Note: NR= Not Run

Verification Summary - January 18, 1993
FIELD SERVICES LABORATORY ANALYTICAL RESULTS
SAN JUAN RIVER PLANT - NORTH FLARE PIT

							EPA Met. 8020 (BTEX) (MG/KG)				
Sample Number	Sample Location	Sample Description	Time	Date (MM/DD/YY)	IR TPH Mod. 418.1 (MG/KG)	C6-C36 TPH Mod. 8015 (MG/KG)	B	T	E	X	TCLP Metals
N22632	Stockpile, South Side	Clay	1415	10/23/92	<10	NR	NR	NR	NR	NR	NR
N22633	Stockpile, (Top) North Side	Fine Sand	1410	10/23/92	<10	NR	NR	NR	NR	NR	NR
N22634	West Side of North Face	Clay	1435	10/23/92	<10	NR	NR	NR	NR	NR	NR
N22635	East Side of North Face	Fine Sand	1440	10/23/92	<10	NR	NR	NR	NR	NR	NR
N22642	Background, 300 feet Suth of Pit	Sand	1435	10/26/92	<10	NR	NR	NR	NR	NR	NR

Note: NR = Not Run

Verification Summary - January 18, 1993
FIELD SERVICES LABORATORY ANALYTICAL RESULTS
SAN JUAN RIVER PLANT - NORTH FLARE PIT

							EPA Met. 8020 (BTEX) (MG/KG)				
Sample Number	Sample Location	Sample Description	Time	Date (MM/DD/YY)	IR TPH Mod. 418.1 (MG/KG)	C6-C36 TPH Mod. 8015 (MG/KG)	B	T	E	X	TCLP Metals
N22653	Grid Point #1-1	Sand	1312	10/28/92	1472	1375	<.025	0.069	0.19	0.31	NR
N22654	Grid Point #1-2	Clay	1315	10/28/92	187	103	<.025	0.029	<.025	0.026	NR
N22655	Grid Point #1-2, Field Duplicate	Clay	1315	10/28/92	91	79	<.025	<.025	<.025	<.025	NR
N22656	Grid Point #1-3	Clay	1318	10/28/92	370	421	<.025	<.025	0.031	0.13	NR
N22657	Grid Point #1-4	Clay	1320	10/28/92	<10	17	<.025	<.025	<.025	<.025	NR
N22658	Grid Point #2-1	Clay & Rock	1323	10/28/92	3068	2860	<.025	<.025	0.4	0.69	NR
N22659	Grid Point #2-2	Clay & Rock	1325	10/28/92	627	534	<.025	<.025	0.08	0.17	NR
N22660	Grid Point #2-3	Clay & Rock	1328	10/28/92	2437	1699	<.025	0.042	0.2	0.43	NR
N22661	Grid Point #2-4	Sand & Clay	1331	10/28/92	1156	1010	<.025	0.028	0.059	0.2	NR
N22662	Grid Point #3-1	Clay	1334	10/28/92	1804	1375	<.025	<.025	0.23	0.26	NR
N22663	Grid Point #3-2	Black Clay	1336	10/28/92	1390	1231	<.025	<.025	0.13	0.26	NR
N22664	Grid Point #3-2, Field Duplicate	Black Clay	1336	10/28/92	1306	1346	<.025	<.025	0.13	0.27	NR
N22665	Grid Point #3-3	Wet Clay	1339	10/28/92	228	307	<.025	0.03	0.12	0.28	NR
N22666	Grid Point #3-4	Clay	1342	10/28/92	2065	1777	<.025	0.078	0.11	0.43	NR
N22667	South Wall, West End	Sand	1345	10/28/92	140	17	<.025	<.025	<.025	<.025	NR
N22668	South Wall, East End	Clay	1348	10/28/92	958	585	<.025	<.025	<.025	0.084	NR
N22669	East Wall, In Stain	Clay	1351	10/28/92	35	100	<.025	<.025	<.025	<.025	NR
N22670	East Wall, Above Stain	Clay	1354	10/28/92	<10	5	<.025	<.025	<.025	<.025	NR
N22671	North Wall, E. End Above Stain	Sand	1358	10/28/92	<10	<5	<.025	<.025	<.025	<.025	NR
N22672	North Wall, W. End In Stain	Sand	1402	10/28/92	8298	NR	NR	NR	NR	NR	NR
N22673	West Wall, No Stain	Sand	1406	10/28/92	7516	NR	NR	NR	NR	NR	NR
N22674	Background	Sand	1428	10/28/92	<10	<5	<.025	<.025	<.025	<.025	NR
N22675	Background	Sand	1432	10/28/92	<10	<5	<.025	<.025	<.025	<.025	NR
N22695	North Wall, West	Fine Sand	1250	10/30/92	<10	11	<.025	<.025	<.025	<.025	NR
N22696	West Wall	Fine Sand	1255	10/30/92	<10	<5	<.025	<.025	<.025	<.025	NR

Note: NR = Not Run

El Paso
Natural Gas Company

MEMORANDUM

To: John Lambdin

Date: October 30, 1992

From: Dennis Bird

Place: Field Services
Engineering-Lab

Subject: San Juan North Flare Pit

On Wednesday, October 28, 1992, I went to San Juan River to collect final vertification samples on the north flare pit. There were samples taken on different layers on each of the 4 walls. Samples were taken on the bottom of the pit at various locations. Attached is a drawing of the area that was sampled.

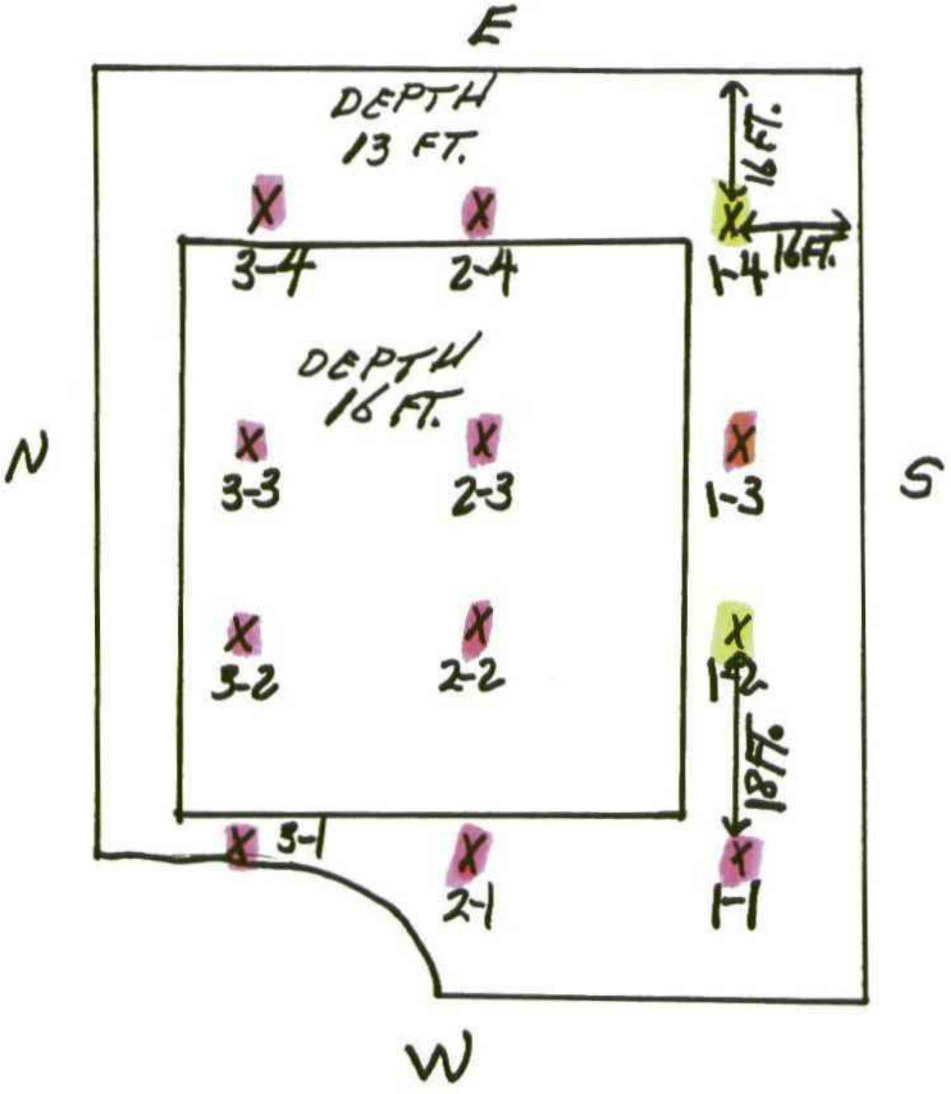
The soil was to be analyzed for Total Petroleum Hydrocarbons (TPH) and BTXE (Mod 8015/8020). The TPH will be by the EPA Method To Accommodate Soil Samples. The samples were assigned the Lab numbers N22653 to N22675. The field services laboratory will be analyzing for TPH. The samples for BTXE (Mod 8015/8020) were sent to Analytical Technologies Inc. in Phoenix, Arizona for analysis.

Should you have any question or comments, please let me know.

Dennis Bird
Dennis P. Bird

cc. Sandra Miller

SAN JUAN RIVER
NORTH FLARE PIT
10-28-92



Onsite Landfarm Summary

As noted earlier, EPNG requested approval from NMOCD to landfarm the flare pit soils onsite. A copy of this request may be found in Section 5c. The supporting reasons for this request were the lack of BTXE present in the contaminated soil, and the relatively low TPH levels that were measured (<10,000ppm). Also, the trenching exercise indicated that the clay layer in the pit bottom extended under the landfarm location. It would, therefore, act as a good barrier in preventing migration of hydrocarbons to groundwater. On October 19, 1992, EPNG received approval to proceed with landfarming the soil on site. The landfarm is located on EPNG property in the area located due west and south of the south flare pit. The aerial drawing in Section 4 depicts the landfarm facility.

Soil from the south flare pit was spread on the landfarm site in a 6" layer. As the north pit soil was being transferred to the landfarm, it became evident that space was going to be a factor. EPNG proposed to the local NMOCD inspector that the contaminated layer be increased from 6" to 10". The inspector agreed to the proposal, with the stipulation that the equipment used to turn the soil have the capability of disking at least 14". EPNG and it's contractor proposed that we utilize a Ford Farm Tractor 8000 Series equipped with a 3 bottom plow. The NMOCD inspector, after taking a look at the proposed equipment, agreed to increasing the thickness of the contaminated layer.

The entire perimeter of the landfarm area was protected by 3'-4' berms. Double berms were installed along the south and west edges because of the tendency for run off to go in that direction. In addition to the outer berms, internal berms were built to keep the cells from being too large. The internal berms were installed perpendicular to the direction of potential water run off.

Burlington Environmental has been contracted to administer the facility in accordance with NMOCD guidelines. Background samples were secured from the landfarm site prior to spreading soil. These results may be found in Section 3b. Once the soil was spread, an initial set of samples was secured to establish a baseline. A copy of the grid representing this sampling effort is also in Section 3b. The results are not yet available. The landfarm will continue to be sampled periodically for the purpose of monitoring the remediation rate of the soil. Should EPNG decide to enhance degradation by treating the soil with fertilizers, bacteria, or any other substance, NMOCD will be contacted for approval prior to implementation.

El Paso
Natural Gas Company

MEMORANDUM

TO: Sandra Miller

DATE: 11/24/92

FROM: John Lambdin

PLACE: Field Services
Engineering Lab

Project: San Juan River Plant Landfarm - Background Soil

On October 21, 1992, the Farmington Field Services Engineering Laboratory collected one (1) soil sample for Total Petroleum Hydrocarbon (TPH), General Chemistry, and heavy metals analysis from the referenced site. The sample was collected in accordance with New Mexico OCD landfarm treatment zone monitoring requirements. The sample was assigned the Field Services Laboratory number N22486.

The sample was analyzed at EPNG's Laboratory for TPH by EPA Method 418.1 modified to accommodate soil samples. We also analyzed the sample for general chemistry components by first producing an aqueous extract of the sample and analyzing the extract solution according to "Standard Methods". Equal portions of the soil (mass:mass ratio) were mixed with high purity 18 Megohm water and ultrasonicated for 10 minutes followed by gravity filtration to produce the extract.

A split portion of the sample was analyzed for TPH by Analytical Technologies (ATI) using Modified EPA method 8015 and for BETX using EPA Method 8020. ATI also analyzed the sample for heavy metals using standard EPA methods.

Enclosed are the analytical results for all these tests, any necessary C.O.C. information, and any quality control reports required.

Please let me know, if you have any questions or comments.

John Lambdin

John Lambdin

cc: David Hall
Results Log Book
File

Attachments:

FIELD SERVIC[illegible]ABORATORY ANALYTICAL RESULTS
SAN JUAN RIVER PLANT – South Flare Pit Soil Remediation Site – Land Farm
Collected By: Richard Benson and Dennis Bird

Date Collected: 10/21/92
Date Extracted: 10/21/92
Date Analyzed: 10/21/92
Holding Time Status: Acceptable

Field ID	Sample Number	Sample Location	Sample Description	Time	Date (MM/DD/YY)	Matrix	IR TPH Mod. 418.1 (MG/KG)	Data Qualifier
1	N22486	Middle of Dirt Farm (SRS) at 2 Foot Depth	Brown: Sandy	1130	10/21/92	Soil	<10	

NOTES:

Approved: 10/22/92
Date

QUALITY CONTROL REPORT

Modified 418.1 by Infrared
Total Petroleum Hydrocarbons
Samples N22486 to N22472

LABORATORY CONTROL SAMPLES: CALIBRATION CHECKS

SAMPLE ID	SOURCE	TRUE VALUE (PPM)	FOUND (MG/KG)	%R	ACCEPTABLE RANGE 75-125 %R YES	NO
INITIAL CALIBRATION VERIFICATION "B" Heavy Oil (Lot MOR9480)	HORIBA	300.0	297.6	99.2	X	

LABORATORY AND FIELD DUPLICATES:

SAMPLE NUMBER	TYPE	SAMPLE RESULT (S)MG/KG	DUPLICATE RESULT (D)MG/KG	RPD	ACCEPTABLE RANGE + / - 35% YES	NO
None In This Set	2nd Extract					

LABORATORY SPIKES:

SAMPLE NUMBER	SPIKE ADDED (SA)MG/KG	SAMPLE RESULT (S)MG/KG	SPIKE SAMPLE RESULT (SR)MG/KG	%R	ACCEPTABLE RANGE 75-125 %R YES	NO
None In This Set						

REFERENCE SOIL (Laboratory Control Sample):

SAMPLE ID	SOURCE	KNOWN VALUE (MG/KG)	SAMPLE RESULT FOUND (MG/KG)	RPD	ACCEPTABLE RANGE + / - 35% YES	NO
ERA TPH STANDARD #1 LOT # 91016	ENVIRONMENTAL RESOURCE ASS.	2350	2606	10.3	X	
ERA TPH STANDARD #2 w/interf. LOT # 91016	ENVIRONMENTAL RESOURCE ASS.	Not Run	Not Run	ERR		

LABORATORY REAGENT BLANK:

SAMPLE ID	SOURCE	TPH LEVEL (MG/KG)	STATUS
Freon Solvent	HORIBA	<10.0	ACCEPTABLE
Reagent Blank	EPNG Lab	<10.0	ACCEPTABLE

Approved By: 10/22/92
Date

EL PASO NATURAL GAS COMPANY
FIELD SERVICES LABORATORY – WATER ANALYSIS

LOCATION: San Juan River Plant
SOURCE: Land Farm Soil, 2' below Surface
DATE OF SAMPLE: 10-21-92
SAMPLED BY: Richard Benson
Matrix: Soil Ectract
Extraction Date: 11-12-92

PROJECT: LF Monitoring
SAVE FILE: N22486W
REPORT DATE: Nov. 24, 1992

SAMPLE POINT	Middle of Land Farm 2' Down			
LAB ID #	N22486			
pH (Units)	7.74			
CALCIUM AS Ca	136			
MAGNESIUM AND Mg	13			
TOTAL HARDNESS AS CaCO3	393			
CHLORIDE AS Cl	26			
SULFATE AS SO4	162			
FLUORIDE AS F	5.7			
POTASSIUM AS K	10			
SODIUM as Na	30			
CONDUCTIVITY (umhos)	900			
NITRATE as NO3-N	67			
Anion – Cation Balance	Attached			

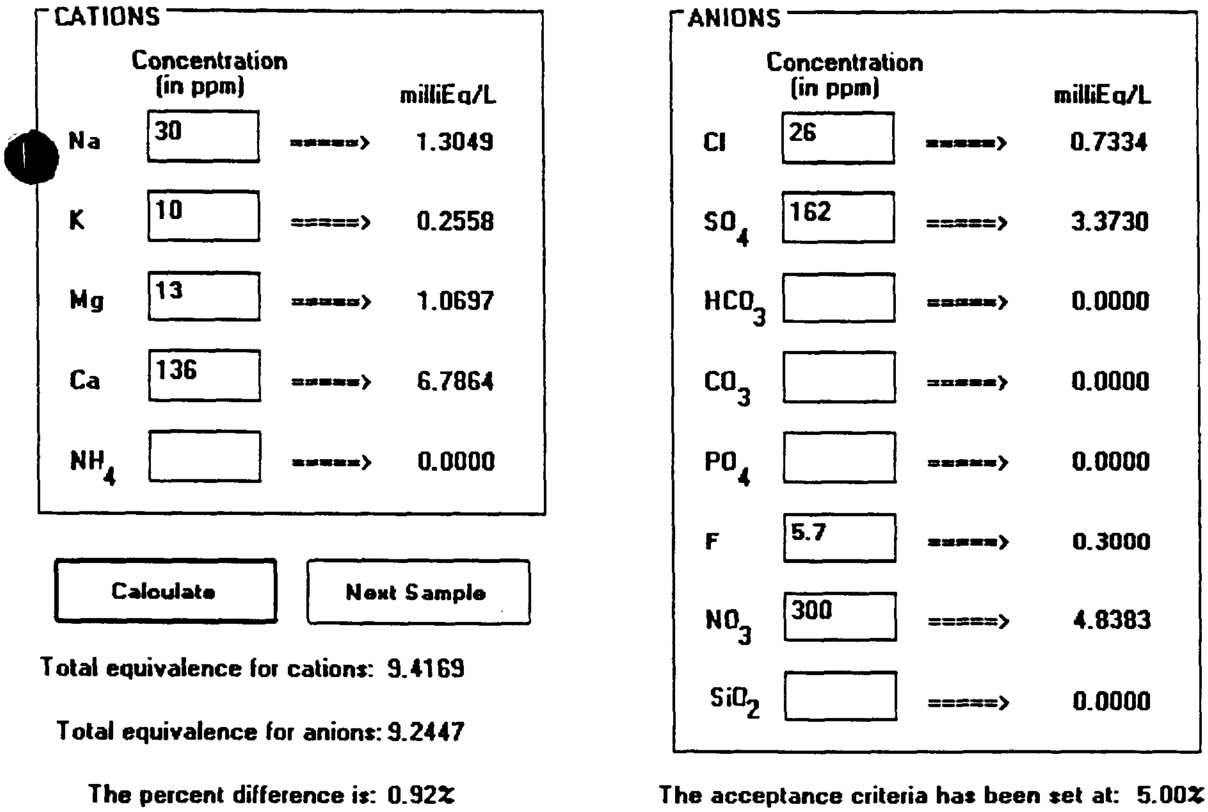
-- All Results expressed as ppm or umhos --

REMARKS:

The soil sample was extracted in accordance with the procedures outlined in this report. The resulting extractant fluid was analyzed for the parameters shown above using procedures outlined in Standard Methods for the Examination of Water and Wastewater, AWWA, 17 Edition, 1989.

11/24/92
Analyst Date

11/24/92
Lab Superintendent Date



CATIONS

	Concentration (in ppm)		milliEq/L
Na	30	=====>	1.3049
K	10	=====>	0.2558
Mg	13	=====>	1.0697
Ca	136	=====>	6.7864
NH_4		=====>	0.0000

ANIONS

	Concentration (in ppm)		milliEq/L
Cl	26	=====>	0.7334
SO_4	162	=====>	3.3730
HCO_3		=====>	0.0000
CO_3		=====>	0.0000
PO_4		=====>	0.0000
F	5.7	=====>	0.3000
NO_3	300	=====>	4.8383
SiO_2		=====>	0.0000

Total equivalence for cations: 9.4169

Total equivalence for anions: 9.2447

The percent difference is: 0.92%

The acceptance criteria has been set at: 5.00%

Anion - Cation Balance
Sample # N22486
San Juan River Plant
Land Farm Soil Extract

El Paso
Natural Gas Company

CHAIN OF CUSTODY RECORD

Project No.	Project Name SJRP - Flare Pit			Contract Laboratory EPNG
Samplers: (Signature) Richard Pearson	Date 10-21-92	Receiving Temp. (°F)		

Lab ID	Date	Time	Matrix	Sample Number	Total No. of Containers	Chain of Custody Seals	Intact?	Composite or Grab	See Attached	TPH	Gen-Chem		Remarks
	10-21-92	1130	Soil	N22486	1 4oz					X	X		Middle of Dirt Farm - 2' deep

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Richard Pearson	10/21/92 1200				
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks:	
			10/21/92 1310		

Results & Invoices to::

Charge Code

Date Results Reported / by: (Signature)

WHITE-Testing Laboratory YELLOW-EPNG Lab PINK-Field Sampler

AnalyticalTechnologies, Inc. 9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 210908

November 6, 1992

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499

Project Name/Number: None given San Juan River Plant
South Flare Pit LAND FARM
Middle of Land Farm
2' below Native Grond Surface

Attention: John Lambdin

On **10/23/92**, Analytical Technologies, Inc. received a request to analyze **soil** sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Jane Foote for
Mary Tyer
Project Manager

Robert V. Woods
Robert V. Woods
Laboratory Manager

RVW:ktd
Enclosure

NOV 1992

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

IENT : EL PASO NATURAL GAS, NEW MEXICO DATE RECEIVED : 10/23/92
PROJECT # : (NONE)
PROJECT NAME : (NONE) REPORT DATE : 11/05/92
ATI I.D. : 210908

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N22486 2' below Native Grond Surface Middle of Land Farm	SOIL	10/21/92

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact r sample control department before the scheduled disposal date.

AnalyticalTechnologies, Inc.

METALS RESULTS

ATI I.D. : 210908

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 10/23/92

REPORT DATE : 11/05/92

PARAMETER	UNITS	01
SILVER	MG/KG	<0.5
ARSENIC	MG/KG	<5
BARIUM	MG/KG	296
CADMIUM	MG/KG	0.3
CHROMIUM	MG/KG	29.5
MERCURY	MG/KG	<0.1
LEAD	MG/KG	7
SELENIUM	MG/KG	<5

Analytical Technologies, Inc.

METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : (NONE)
ATI I.D. : 210908

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER	MG/KG	21090801	<0.5	<0.5	NA	20.2	25.0	81
ARSENIC	MG/KG	21090801	<5	<5	NA	42	50	84
BARIUM	MG/KG	21090801	296	286	3	341	50.0	90
CADMIUM	MG/KG	21090801	0.3	<0.3	NA	21.0	25.0	83
CHROMIUM	MG/KG	21090801	29.5	29.9	1	71.8	50.0	85
MERCURY	MG/KG	21090801	<0.1	<0.1	NA	2.5	2.5	100
LEAD	MG/KG	21090801	7	6	15	48	50	82
SELENIUM	MG/KG	21090801	<5	<5	NA	39	50	78

Acceptable.
18
11-14-92

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical**Technologies,** Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21090801

TEST : FUEL HYDROCARBONS (MOD. EPA 8015, BLS-191)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : (NONE)
CLIENT I.D. : N22486
SAMPLE MATRIX : SOIL

DATE SAMPLED : 10/21/92
DATE RECEIVED : 10/23/92
DATE EXTRACTED : 10/23/92
DATE ANALYZED : 10/28/92
UNITS : MG/KG
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS, C6-C10	<5
FUEL HYDROCARBONS, C10-C22(BLS-191)	<5
FUEL HYDROCARBONS, C22-C36	18
FUEL HYDROCARBONS (CALCULATED SUM)	18
SURROGATE PERCENT RECOVERIES	
DI-N-OCTYL PHTHALATE (%)	64

Analytical**Technologies,** Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : FUEL HYDROCARBONS (MOD. EPA 8015, BLS-191)

ATI I.D. : 210908
DATE EXTRACTED : 10/23/92
DATE ANALYZED : 10/24/92
UNITS : MG/KG
DILUTION FACTOR : N/A

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : (NONE)
CLIENT I.D. : REAGENT BLANK

COMPOUNDS	RESULTS
FUEL HYDROCARBONS, C6-C10	<5
FUEL HYDROCARBONS, C10-C22(BLS-191)	<5
FUEL HYDROCARBONS, C22-C36	<5
FUEL HYDROCARBONS (CALCULATED SUM)	<5

SURROGATE PERCENT RECOVERIES

DI-N-OCTYL PHTHALATE (%)	86

Acceptable
11-14-92

AnalyticalTechnologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 210908

TEST : FUEL HYDROCARBONS (MOD. EPA 8015, BLS-191)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : (NONE)
REF I.D. : 21091026

DATE ANALYZED : 10/25/92
SAMPLE MATRIX : SOIL
UNITS : MG/KG

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
FUEL HYDROCARBONS (C10-C22)	<5	50	41	82	41	82	0

Acceptable
11-14-92

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21090801

TEST : BTEX (8020) AND MTBE

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : (NONE)
CLIENT I.D. : N22486
SAMPLE MATRIX : SOIL

DATE SAMPLED : 10/21/92
DATE RECEIVED : 10/23/92
DATE EXTRACTED : 10/23/92
DATE ANALYZED : 10/26/92
UNITS : MG/KG
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025
METHYL-t-BUTYL ETHER	<0.12
SURROGATE PERCENT RECOVERIES	
BROMOFLUOROBENZENE (%)	86

Analytical **Technologies,** Inc. GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : BTEX (8020) AND MTBE

		ATI I.D.	: 210908
CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE EXTRACTED	: 10/23/92
PROJECT #	: (NONE)	DATE ANALYZED	: 10/23/92
PROJECT NAME	: (NONE)	UNITS	: MG/KG
CLIENT I.D.	: REAGENT BLANK	DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025
METHYL-t-BUTYL ETHER	<0.12

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE (%)	92

Acceptable
11-14-92

Analytical**Technologies,** Inc.

QUALITY CONTROL DATA

ATI I.D. : 210908

TEST : BTEX (8020) AND MTBE

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : (NONE)
REF I.D. : 21091026

DATE ANALYZED : 10/24/92
SAMPLE MATRIX : SOIL
UNITS : MG/KG

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	<0.025	1.0	0.98	98	0.93	93	5
TOLUENE	<0.025	1.0	0.98	98	0.88	88	11
ETHYLBENZENE	<0.025	1.0	0.95	95	0.89	89	7
TOTAL XYLENES	<0.025	3.0	3.0	100	2.7	90	11
METHYL-T-BUTYL ETHER	<0.12	2.0	2.2	110	2.1	105	5

Acceptable.
11-19-92

$$\text{\% Recovery} = \frac{\text{(Spike Sample Result - Sample Result)}}{\text{Spike Concentration}} \text{ X } 100$$

$$\text{RPD (Relative \% Difference)} = \frac{\text{(Spiked Sample Result - Duplicate Spike Sample Result)}}{\text{Average of Spiked Sample}} \text{ X } 100$$

PLEASE FILL THIS FORM IN COMPLETELY. ~~SHADED AREAS ARE FOR LAB USE ONLY.~~

Analy[illegible]alTechnologies,Inc., Phoenix, Arizona
San Diego • [illegible]hoenix • Seattle • Pensacola • Ft. Collins • Portland

CHAIN OF CUSTODY

DATE: 10[illegible]-92 PAGE 1 OF 1

ATI LAB I.D. 210908

PROJECT MANAGER: JOHN LAMBDIN

COMPANY: EL PASO NATURAL GAS COMPANY
ADDRESS: P.O. Box 4990
FARMINGTON NM 87499
PHONE: 505-599-2144
FAX:

BILL TO:
COMPANY: SAME AS ABOVE
ADDRESS:

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
N22486	10-21-92	1130	SOIL	1

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1)	(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE/MTBE (MOD 8015/8020)	BTXE/MTBE (8020)	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	SDWA Volatiles (502.1/503.1), 502.2 Reg. & Unreg.	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	Polynuclear Aromatics (610/8310)	SDWA Primary Standards - Arizona	SDWA Secondary Standards - Arizona	SDWA Primary Standards - Federal	SDWA Secondary Standards - Federal	The 13 Priority Pollutant Metals	RCRA Metals by Total Digestion	RCRA Metals by TCLP (1311)	NUMBER OF CONTAINERS
		X															X		2

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJ. NO.:		NO. CONTAINERS	2
PROJ. NAME:		CUSTODY SEALS	Y / N / [✓ NA]
P.O. NO.:		RECEIVED INTACT	Y
SHIPPED VIA:		RECEIVED COLD	Y

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐24hr ☐48hr ☐72hr ☐1 WEEK [✓ (NORMAL)] ☐2 WEEK

Comments:
Charge code - 108-X48734-001-2010

SAMPLED & RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Richard Benson Time: 1245	Signature: Time:	Signature: Time:
Printed Name: RICHARD BENSON Date: 10/21/92	Printed Name: Date:	Printed Name: Date:
Company: EPNG Phone: 599-2142	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
Signature: Time:	Signature: Time:	Signature: Time: 10:03
Printed Name: Date:	Printed Name: Date:	Printed Name: Linda Eshelman Date: 10/23/92
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619) 458-9141 • Phoenix (602) 496-4400 • Seattle (206) 228-8335 • Pensacola (904) 474-1001 • Portland (503) 684-0447 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

El Paso
Natural Gas Company

MEMORANDUM

To: John Lambdin

From: Dennis Bird

Date: January 15, 1993

Place: Field Services
Engineering-Lab

Project: San Juan River Dirt Farm

On Thursday, January 14, 1993 Richard Benson and I went to San Juan River to collect soil samples from the dirt farm. This was the first sampling since the dirt was removed from the north and south flare pits. Attached is a drawing where the samples were taken.

The soil was to be analyzed for Total Petroleum Hydrocarbons (TPH). The samples were analyzed by the EPA Method 418.1 Modified to accommodate soil samples. The samples were assigned the laboratory numbers N30025 to N30063. The field services laboratory will be analyzing the soil.

The samples were stored on ice immediately after collection. The soil was sampled using a auger, sampling depth was between 4 to 6 inches deep.

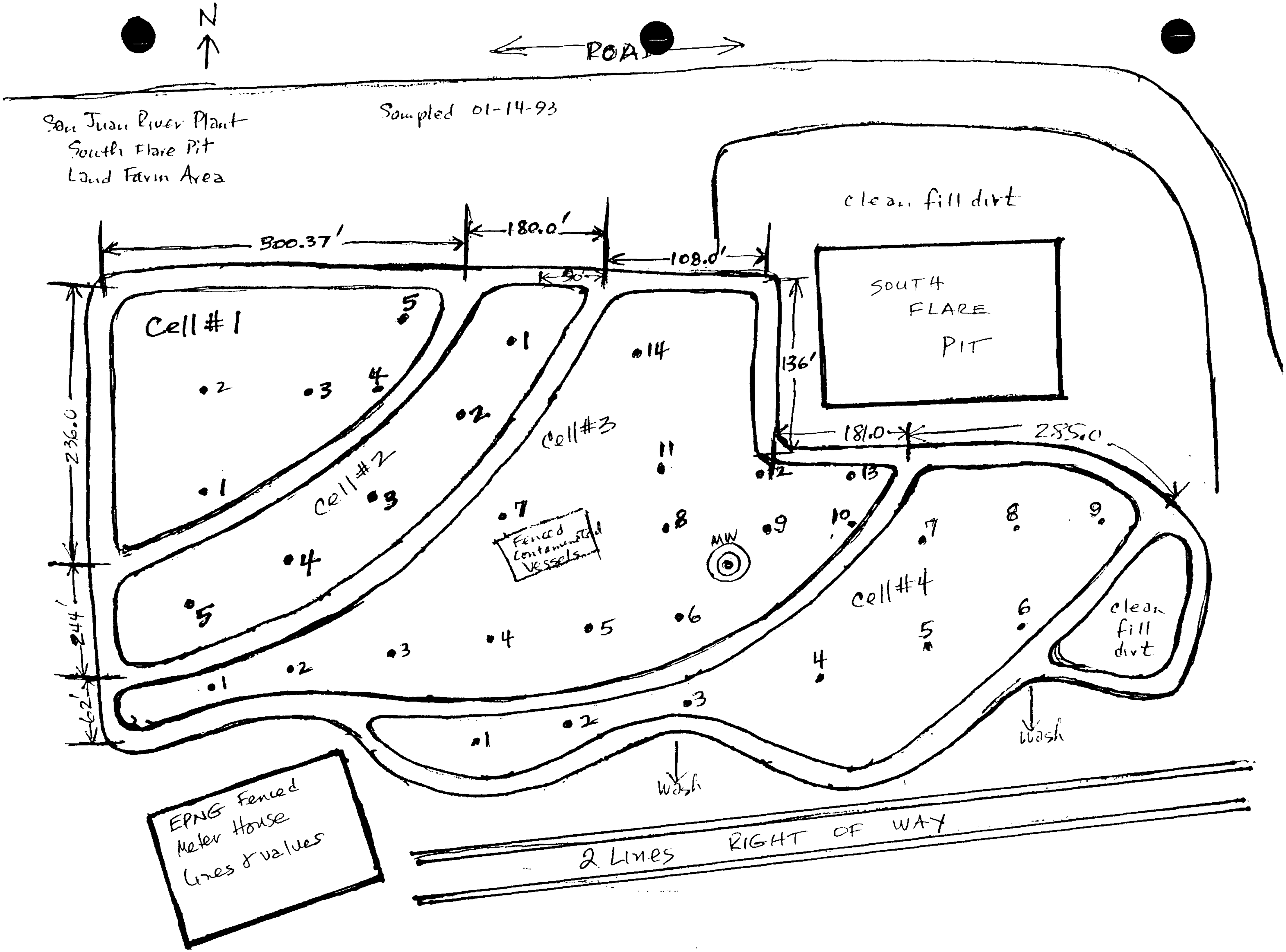
Should you have any question or comments please let me know.

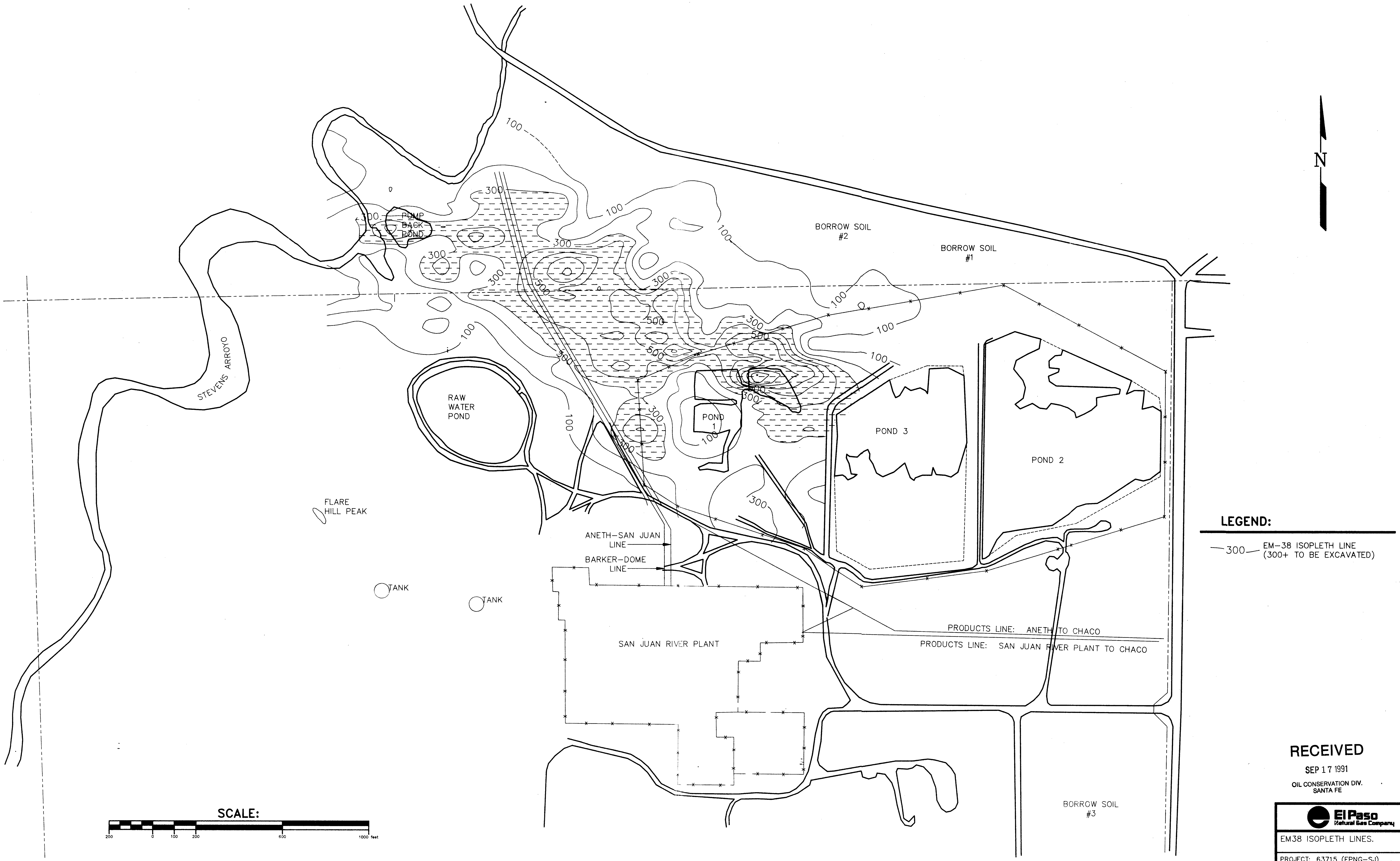
Dennis Bird
Dennis P. Bird

cc. David Hall
Sandra Miller

San Juan River Plant
South Flare Pit
Land Farm Area

Sampled 01-14-93





RECEIVED

SEP 17 1991

OIL CONSERVATION DIV.
SANTA FE

El Paso
Natural Gas Company

EM38 ISOPLETH LINES.

PROJECT: 63715 (EPNG–SJ)
LOCATION: SAN JUAN RIVER PLANT

K.W. BROWN
&
ASSOCIATES, INC.

DATE: 12\15\89
FIGURE: 2
SCALE: SHOWN

El Paso
Natural Gas Company

P. O. BOX 4990
FARMINGTON, NEW MEXICO 87499

September 16, 1992

Mr. William C. Olson
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504

Re: Flare Pit Closures at San Juan River Plant

Dear Mr. Olson,

El Paso Natural Gas Co. is developing final plans to close the north and south flare pits at San Juan River Plant per discharge plan requirements. We are seeking NMOCD approval to close the pits in the following manner.

As stated in our November 1, 1991 correspondence to NMOCD, visually contaminated soil is to be removed from each of the flare pits to a depth of approximately 10 feet. An assessment will be made at that time to determine the need for further action.

For the south flare pit, rocks shall be separated from the contaminated soil. This will be performed by running the soil through a "shaker" type apparatus on site. Removal of the rocks will help us reduce costs by reducing the volume going to the landfarm. All rocks that are separated out will be allowed to weather, will be placed back into the excavation, and covered with backfill. This procedure will also be performed for the north flare pit, should the situation warrant.

Monitor well #MW-4, W-2, and piezometer P-8 were sampled on July 8, 1992 and analyzed for BTEX. All results were below detectable limits for those constituents. For your convenience, I have enclosed a copy of a drawing which indicates the position of the sampling points with regard to the flare pits. I have also enclosed copies of the analytical data.

The south flare pit will be backfilled with native soil taken from EPNG property near our Angel Peak facility. The north flare pit will be backfilled with dike material taken from the nearby evaporation pond. In order to prevent surface ponding, both pits will be contoured appropriately to divert runoff.

All contaminated soil will be transported to Envirotech's landfarm facility located on highway 44. Remediation and transportation services will be provided by Burlington Environmental, Inc..

EPNG wishes to begin remediation activities as soon as possible. El Paso would like to schedule work to begin the week of 9/21/92, pending your approval.

If you have any questions or comments regarding this matter, you can reach me at (505)599-2141. Your prompt attention would be greatly appreciated.

Sincerely,

El Paso Natural Gas Co.

Sandra D Miller
Sandra D. Miller
Sr. Environmental Scientist

cc: W.D. Hall, El Paso Natural Gas Co.
Denny Foust, NMOCD

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Burlington Environmental
Seattle Facility

Date: July 17, 1992

Report On: Analysis of Water

Lab No.: 25610
Page 1 of 4

IDENTIFICATION:

Samples received on 07-13-92
Project: EPNG

ANALYSIS:

[redacted]

Lab No. 25610-1 Client ID: [redacted] 40285-1

BTEX by Method 8020
Date Extracted: 7-15-92
Date Analyzed: 7-15-92

Benzene, mg/l	< 0.001
Toluene, mg/l	< 0.001
Ethyl Benzene, mg/l	< 0.001
Xylenes, mg/l	< 0.001

SURROGATE RECOVERY, %

Trifluorotoluene	134

SJRP P-9

Lab No. 25610-2 Client ID: N21614 40285-2

BTEX by Method 8020
Date Extracted: 7-15-92
Date Analyzed: 7-15-92

Benzene, mg/l	< 0.001
Toluene, mg/l	< 0.001
Ethyl Benzene, mg/l	< 0.001
Xylenes, mg/l	< 0.001

SURROGATE RECOVERY, %

Trifluorotoluene	79

Continued . . .

Burlington Environmental
Project: EPNG
Page 2 of 4
Lab No. 25610
July 17, 1992

[redacted]

Lab No. 25610-3 Client ID: [redacted] 40285-3

BTEX by Method 8020
Date Extracted: 7-15-92
Date Analyzed: 7-15-92

Benzene, mg/l	< 0.001
Toluene, mg/l	< 0.001
Ethyl Benzene, mg/l	< 0.001
Xylenes, mg/l	< 0.001

SURROGATE RECOVERY, %

Trifluorotoluene	150

[redacted]

Lab No. 25610-4 Client ID: [redacted] 40285-4

BTEX by Method 8020
Date Extracted: 7-15-92
Date Analyzed: 7-15-92

Benzene, mg/l	< 0.001
Toluene, mg/l	< 0.001
Ethyl Benzene, mg/l	< 0.001
Xylenes, mg/l	< 0.001

SURROGATE RECOVERY, %

Trifluorotoluene	92

Continued . . .

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

QUALITY CONTROL REPORT

BTEX by EPA SW-846 Method 8020

Client: Burlington Environmental Seattle Office
Lab No: 25610qc
Matrix: Water
Units: mg/l
Date: July 17, 1992

DUPLICATES

Dup No. 25610-5

Parameter	Sample (S)	Duplicate (D)	RPD	FLAGS
Benzene	5.6	5.5	1.8	
Toluene	0.25	0.23	8.3	
Ethyl Benzene	0.24	0.24	0.0	
Xylenes	1.2	1.2	0.0	
<u>SURROGATE RECOVERY,%</u>				
Trifluorotoluene	142	141		

RPD = Relative Percent Difference
= $[(S - D) / ((S + D) / 2] \times 100$

Acceptable
8/17/92

METHOD BLANK

Blank No. 92071603

Parameter	Blank Value
Benzene	< 0.001
Toluene	< 0.001
Ethyl Benzene	< 0.001
Xylenes	< 0.001
<u>SURROGATE RECOVERY,%</u>	
Trifluorotoluene	86

BURLINGTON ENVIRONMENTAL, INC.
Chempro Division
2203 Airport Way South, Suite 400
Seattle, WA 98134
206 223-0500 • FAX: 223-7791

Chain of Custody/ Laboratory Analysis Request

DATE 7-10-92 PAGE 1 OF 1

PROJECT EPNG #
CLIENT INFO CONTACT K. Krebs
CHEMPRO DIVISION/GENERATOR NAME Burlington Enviro LAB
TELEPHONE # 223.0500
SAMPLERS NAME John Lambdin PHONE #
SAMPLERS SIGNATURE

	SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS 624/8240	PCB's 608/8080	TPH (circle method) 418.1 or 8015	BETX (circle method) 8240 or [✓ 8020]	F-LISTED SOLVENTS 8240	TCLP F-LISTED SOLVENTS 1311/8240	TCLP METALS D004-11	METALS (TOTAL) As, Ba, Cd, Cr, Cu, Pb, Ni, Hg, Ag, Se, Tl, Sb, Zn	TCLP ORGANICS (specify methods) • VOA's 8240 • BNA's 8270 • Pesticides 8080 • Herbicides 8150	DISCHARGE TESTING	OTHER (Specify)						NUMBER OF CONTAINERS	RECEIVED IN GOOD CONDITION?
1	[redacted]	7-8-92	1210	40285-1	water					X													2	
2	N21614	7-8-92	1350	40285-2	water					X													2	
3	[redacted]	7-8-92	1455	40285-3	water					X													2	
4	[redacted]	7-8-92	1505	40285-4	water					X													2	
5	N21617	7-8-92	1530	40285-5	water					X													2	
6	N21618	7-8-92	1615	40285-6	water					X													2	
7	N21619	7-8-92	1655	40285-7	water					X													2	
8																								

Relinquished By T. Claus
Signature T. Claus
Printed Name BEI
Firm 7-10-92
Date/Time

Relinquished By
Signature
Printed Name Palmquist
Firm SAS
Date/Time 7-13 10:30A

Relinquished By
Signature
Printed Name
Firm
Date/Time

Received By
Signature
Printed Name PALMQUIST
Firm SAS
Date/Time 7-13 10:30A

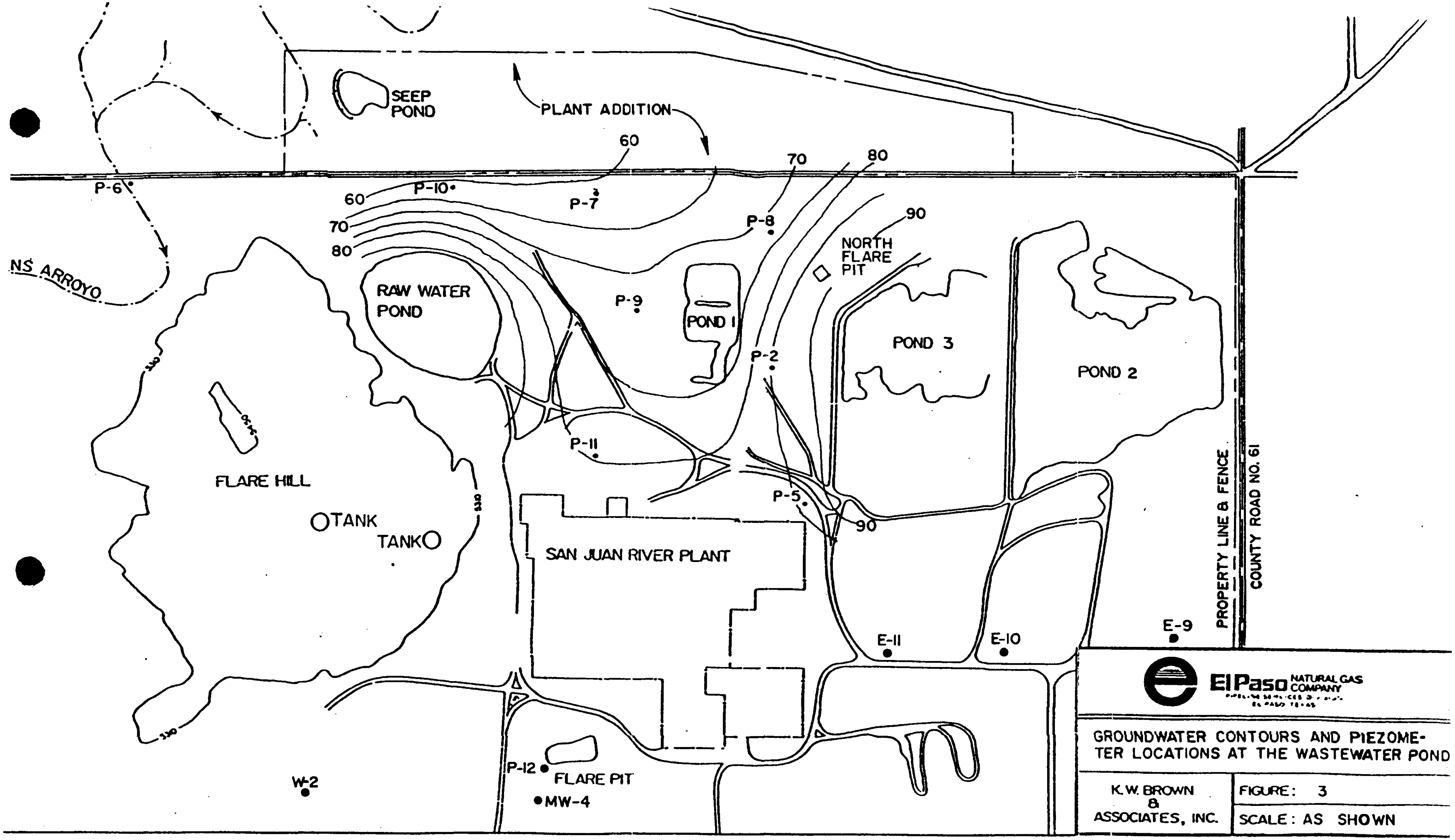
Received By Mary Curtiss
Signature M Curtiss
Printed Name SAS
Firm 7/13/92 10:30
Date/Time

Received By
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS

DISTRIBUTION WHITE return to originator YELLOW lab PINK retained by originator

LAB 200 Rev 10/90



El Paso NATURAL GAS COMPANY

GROUNDWATER CONTOURS AND PIEZOMETER LOCATIONS AT THE WASTEWATER POND

K.W. BROWN & ASSOCIATES, INC.

FIGURE: 3

SCALE: AS SHOWN

AP

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

September 28, 1992

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-242-299

Ms. Sandra D. Miller
Sr. Environmental Scientist
El Paso Natural Gas Company
P.O. Box 4990
Farmington, New Mexico 87499

RE: FLARE PIT CLOSURE
EPNG SAN JUAN RIVER PLANT
SAN JUAN COUNTY, NEW MEXICO

Dear Ms. Miller:

The New Mexico Oil Conservation Division (OCD) has completed a review of the El Paso Natural Gas Company (EPNG) September 16, 1992 "FLARE PIT CLOSURES AT SAN JUAN RIVER PLANT". This plan proposes a method for closure of the north and south flare pits at the San Juan River Plant.

The OCD approves of the above referenced closure plan with the following conditions:

1. The assessment to determine the lateral and vertical extent of contamination related to the flare pits will be performed pursuant to the enclosed OCD "GUIDELINES FOR SURFACE IMPOUNDMENT CLOSURE".
2. The excavations will be inspected by OCD prior to backfilling.
3. A report containing the results of the closure will be submitted to OCD within 60 days of completion of the closure activities.

The OCD understands that closure work at the site will begin on September 28, 1992. Please contact Denny Foust at the OCD Aztec Office prior to commencement of work so that the OCD may have the opportunity to have a representative present.

Please be advised that OCD approval does not limit you to the work proposed should the closure activities fail to remediate petroleum contaminated soils with contaminant levels in excess of OCD actionable levels or if ground water should be impacted by contaminants migrating from the flare pits. In addition, OCD approval does not relieve you of liability under any other laws and/or regulations. If you have any questions please contact me at (505) 827-5885.

Sincerely,

Bill C. Olson

William C. Olson
Hydrogeologist
Environmental Bureau

Enclosure

xc : Denny Foust, OCD Aztec District Office

Draft

GUIDELINES
FOR
SURFACE IMPOUNDMENT CLOSURE

(October 29,1991)

NEW MEXICO OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
P.O. BOX 2088
SANTA FE, NEW MEXICO 87504-2088

PREFACE

The following procedures shall be used as a guide for the closure of surface impoundments used for the containment of those wastes regulated by the Oil Conservation Division, individual districts may impose additional requirements. All plans and specifications shall be submitted to and approved by the Oil Conservation Division prior to closure. Procedures may deviate from the following guidelines if it can be shown that the proposed procedure will remove or isolate contaminants in such a manner that ground water, surface water and the environment are protected from future contamination.

If a number of impoundments are to be closed by a single company, one plan detailing the procedures to be followed at all locations may be submitted for approval. The plan must state the specific location of each impoundment that is to be closed under the procedures proposed in the plan.

Constituents and procedures for soil and ground water testing and remediation may vary depending on the site specific conditions.

INTRODUCTION

OCD Surface Impoundment Closure Guidelines are intended to provide guidance to operators and facility owners for closure of surface impoundments in a manner that assures protection of surface waters, ground waters and the environment.

PART 1 EXEMPT IMPOUNDMENTS

I. SITE ASSESSMENT

Prior to final closure of surface impoundments, the operator or facility owner will perform an investigation to determine the extent to which soils and/or ground water have been impacted by the operation of the impoundment using the following procedures:

A. Soil Contamination Assessment

1. Highly Contaminated Soils

Highly contaminated soils are defined as soils which are stained or saturated with any type of petroleum product. These soils can be distinguished by observing the physical properties of the soil for observable free phase petroleum product, gross staining and evidence of a very strong odor. These physical properties are criteria which may be used to determine if the soil is highly contaminated.

2. Other Contaminated Soils

Other contaminated soils are defined as those soils which do not exhibit highly contaminated characteristics as described in Part 1 I.A.1. above. The following field or laboratory procedures may be utilized to determine the degree of contamination:

a. Headspace Method

i. Fill a 0.5 liter or larger jar half full of sample.

ii. Seal top tightly with aluminum foil.

iii. Ensure sample is at 15 to 25 degrees Celsius or approximately 60 to 80 degrees Fahrenheit. A warm water bath should be used if necessary to raise sample temperature to an acceptable range.

iv. Aromatic hydrocarbon vapor concentrations must be allowed to develop in the headspace of the sample jar for 5 to 10 minutes. During this headspace development period, the sample jar should be shaken vigorously for 1 minute.

v. Pierce aluminum foil seal with the probe of either a PID or FID organic vapor analyzer, and then record the highest (peak) measurement. The instrument must be calibrated to assume a benzene response factor.

b. Laboratory Method

i. Sampling Procedure

1. Collect samples in clean air tight jars, preferably jars supplied by the laboratory which will conduct the analysis.

2. Cool and store samples on ice.

3. Promptly ship sample to the lab for analysis following chain of custody procedures as necessary,

ii. Analysis Methods

Below are the OCD required laboratory methods required for the analysis of contaminated soils. Alternate laboratory methods may be used for analyzing soils for contaminant concentrations, if approved in advance by the OCD.

1. Purgeable organic contaminants will be determined using EPA Method 8010 and EPA Method 8020.

2. Total Petroleum Hydrocarbons (TPH) will be determined using the modified EPA Method 8015.

B. Ground Water Contamination Assessment

The installation of monitor wells to determine the impact of the disposal of wastes to surface impoundments may be required depending on the results of the assessment of soil contamination at the site. If monitor wells are required, they are to be installed and sampled using the following guidelines:

1. Monitor Well Installation

a. Locations

One monitor well should be installed through the center of the impoundment or directly adjacent and downgradient of the impoundment to determine if ground water has been impacted by disposal activities. Additional monitor wells, upgradient and downgradient of the impoundment, to delineate the full extent of ground water contamination may be required if ground water directly underneath the pit has been found to be impacted by disposal activities.

b. Construction

Monitor wells construction materials shall be selected to be chemically resistant to the contaminants to be monitored and be able to be installed without the use of glues or adhesives.

Monitor wells shall be constructed according to accepted industry standards with a minimum of five feet of well screen above the water table to accommodate seasonal fluctuations in the static water table.

2. Ground Water Sampling

Ground water shall be sampled from monitor wells according to accepted industry standards. Samples shall be analyzed for potential contaminants contained in the wastes disposed of in the impoundment. All laboratory analyses will be conducted pursuant to standard EPA Methods unless OCD has approved the use of alternate laboratory methods.

II. Action Levels

A. Soils

The action levels listed below apply directly for sites where soils are to be remediated in place or removed for treatment on the surface.

1. Highly Contaminated Soils

a. Soils which are determined to be highly contaminated either by the observation of physical properties must be remediated.

2. Other Contaminated Soils

a. Field Headspace Method

A measurement of 100 parts per million (ppm) or greater of total organic vapor indicates that remedial action is necessary.

b. Laboratory Method

Remedial action is necessary if any of the following contaminant levels are exceeded:

i. The sum of the concentrations of all detected aromatics is greater than 50 ppm.

ii. The benzene concentration is greater than 10 ppm.

iii. The concentration of TPH is greater than 100 ppm.

B. Ground Water

Ground waters found to be contaminated from waste disposal at a surface impoundment with free phase products and dissolved phase constituents in excess of New Mexico Water Quality Control Commission (WQCC) water quality standards will be required to perform remedial actions.

III. REMEDIATION

A. Soils

When a contaminated soil requires remediation according to standards set forth in Part 1.II.A., it must be remediated according to the criteria described below.

1. Removal

a. Highly Contaminated Soils

Highly contaminated soils should be excavated from the ground to the maximum depth and horizontal extent practicable.

b. Other Contaminated Soils

Contaminated soil which exceeds the action levels set out in Part 1.II.A.2. must be excavated to the maximum depth and horizontal extent practicable until samples from the walls and bottom of the excavation pass the contaminant specific action level.

2. Disposal/Treatment

Below is a list of options to be used for either the treatment or disposal of contaminated soils.

a. Disposal

Excavated contaminated soils may be disposed of offsite at an OCD approved facility with prior OCD approval.

b. Treatment Of Excavated Soils

i. Thin Spreading

Soil must be spread in a single layer no greater than six inches thick in a bermed area. If the depth to the seasonal high static water level is less than 100 feet, the soil must be placed in a level bermed area on an impermeable barrier such as hypalon or concrete. All necessary precautions must be taken to prevent runoff of contaminants or the infiltration of contaminants below the ground surface. The soil should be disced to enhance aerobic biodegradation approximately once every two weeks.

ii. Other Methods

The OCD encourages other methods of soil remediation, including but not limited to, active soil aeration, bioremediation and thermal treatment. Alternatives to thin spreading must be proposed to OCD for approval or disapproval prior to commencement of remediation activities. Soils which are temporarily stockpiled prior to treatment or disposal must be kept on an impermeable barrier in a bermed area to prevent runoff or infiltration of contaminants.

c. Residual Contamination

Where contaminated soils remain beyond the horizontal or vertical extent of practicable excavation, they must be treated in place .In place treatment may be accomplished using vapor venting, bioremediation or some other treatment system. The method to be used must be approved in advance by the OCD and must be capable of reducing contaminant levels in a timely manner.

B. Ground Water

When contaminated ground water requires remediation according to standards set forth in Part 1.II.B., it must be remediated according to the criteria described below.

1. Free Phase Contamination

Free phase products must be removed from ground water. Floating product can be removed from ground water through the use of either skimming type devices or total fluid type pumps. The OCD does not endorse the use of any specific product for the removal of free phase products from ground water.

2. Dissolved Phase Contamination

Ground water contaminated with dissolved phase constituents in excess of WQCC water quality standards can be remediated by either removing and treating the ground water or insitu treatment. The OCD does not require the use of any specific technique or product to remediate contaminated ground water. If treated waters are to be disposed of onto or below the ground surface, a discharge plan must be submitted and approved by OCD.

IV. TERMINATION OF REMEDIAL ACTION

Remedial action may be terminated when the criteria described below have been met:

A. Soils

Soil contamination must be reduced to a concentration which will not contaminate ground water through percolation (aquifer recharge) or as the water table rises and falls with seasonal fluctuations. Analytical testing must be conducted on sites where the seasonal high static water table is 50 feet or less and the ground water contains 10,000 ppm or less of total dissolved solids(TDS). The appropriate, contaminant specific procedure for soils testing must be conducted on representative samples of the remaining contaminated soils. The results of the analysis of these samples must conform to the standards specified in Part 1.II.A.2.. of the guidelines.

If the soil contaminant standards cannot practicably be attained, a risk assessment may be performed and provided to OCD for approval showing that the remaining contaminants will not pose a threat to beneficial use for the foreseeable future

B. Ground Water

A ground water remedial action may be terminated if all free phase product has been removed from the water and the concentration of dissolved phase contaminants in the ground water does not exceed New Mexico WQCC water quality standards.

If the water quality standards cannot practicably be attained, a risk assessment may be performed and provided to OCD for approval showing that the remaining contaminants will not pose a threat to beneficial use for the foreseeable future

V. Final Closure

Upon completion of any necessary remediation activities the impoundment shall be backfilled with clean materials and mounded to prevent ponding.

El Paso
Natural Gas Company

P. O. BOX 4990
FARMINGTON, NEW MEXICO 87499

October 12, 1992

Mr. William Olson
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504

Dear Mr. Olson;

El Paso Natural Gas Co. is currently remediating and closing the two flare pits located at our former San Juan River Plant in Kirtland, NM. Our activities to date have been limited to the south flare pit. We have excavated approximately 10,000 cubic yards of soil since we started the project. We anticipate that the final amount from the south flare pit will be greater than 12,000 cubic yards.

We have identified a distinct clay layer at a depth of approximately 12-15 feet below the original pit bottom. We have also performed some exploratory trenching around the perimeter of the pit. It appears that the contamination at the pit berm is approximately 15 feet thick. As you follow the trench out, the thickness of the contaminated layer drops drastically and quickly. EPNG proposes to remove the contaminated plume to the point where the ratio of overburden vs. contaminated layer is approximately 5:1.

We have performed preliminary sampling and analyses at various phases of the project. A summary of the analytical results along with descriptions of the sample locations is enclosed. The results have indicated the following:

1. The TPH results in the clay layer are well below 100 ppm.
2. The soil that is being excavated from the pit is showing levels of approximately 7000ppm TPH.
3. The excavated soil is very black in color. The blackness is due to the presence of iron sulfide.
4. There is little or no BTEX levels in the excavated soils.
5. The TPH readings indicate hydrocarbons in the range of C10-C36.

Denny Foust of NMOCD's Aztec office has inspected the remediation operations on two different occasions. He has commented that the contaminated soil is not as rich as he anticipated. He also stated that pending your review, the option of landfarming the soil on site **may** be feasible. As a result of the conversations that I have had with Mr. Foust, I am submitting a proposal that EPNG landfarm the soil on site. I feel that the following items are in support of my request.

1. The TPH levels in the clay layer are well below 100ppm. This indicates that the clay is acting as a barrier to any migration. (The clay layer is also evident in the trenches that we excavated.)
2. The monitor well located 100 feet downgradient of the pit has tested negative for BTEX. This supports item #1 above.
3. The contaminated soil has little or no BTEX content. (Well below NMOCD guideline limits.)
4. The TPH levels of the contaminated soil are relatively low.
5. As related to item #2 above, the groundwater has not been impacted by the soil when it was in the pit. Placing it on the surface would be less of a risk.
6. The TPH analyses show hydrocarbons in the range of C10-C36. These are heavy ends and are less likely to migrate.
7. EPNG has adequate property in the immediate vicinity to accommodate a landfarming operation.

As with similar landfarming applications that you have approved for EPNG, the San Juan River site would be operated according to NMOCD guidelines. This would include berming, disking, and periodic sampling. EPNG would also be willing to explore the use of additives to speed up the degradation of the soil. EPNG acknowledges that this would apply to the flare pit project only. Contaminated soils from locations outside of San Juan River Plant would not be brought in.

Landfarming on site would result in significant cost savings to EPNG. If you have any questions or comments, you can reach me at 505/599-2141. I look forward to your response regarding this matter.

Sincerely,

El Paso Natural Gas

Sandra D. Miller

Sandra D. Miller
Sr. Env. Scientist

cc: Mr. Denny Foust, NMOCD, Aztec Office
Mr. W.D. Hall, EPNG

SAN JUAN RIVER PLANT
SOUTH FLARE PIT CLOSURE
SAMPLE DESCRIPTIONS

Sample Number N22296 - This soil sample was taken on the west side of the pit in the area just below the contaminated layer.

Sample Number N22297 - This soil sample was taken on the west side of the pit in the black soil layer, just above the clay layer.

Sample Number N22298 - This soil sample was taken on the east side of the pit in the black soil layer. The clay layer on east side of the pit was deeper than on the west side.

Sample Numbers N22299 to N22301 - These samples were taken from a trench that was dug perpendicular to the west side of the pit, extending outside the pit perimeter.

Sample Numbers N22306 to N22308 - These samples were composited from the excavated soil stockpile.

Sample Numbers N22310 to N22315 - These samples were composited from the excavated soil stock pile.

Sample Number N22316 - This sample was taken at the point at which the clay layer began in the pit bottom.

FIELD SERVICES LABORATORY – ANALYTICAL RESULTS
SAN JUAN RIVER PLANT – SOUTH FLARE PIT
Summary to Date: October 9, 1992

Sample Number	Sample Location	Sample Description	Time	Date (MM/DD/YY)	IR TPH Mod. 418.1 (MG/KG)	C10–C36 TPH Mod. 8015 (MG/KG)	EPA Met. 8020 (BTEX) (MG/KG)				TCLP Metals
							B	T	E	X	
N22296	West Pit @ 10 Foot, Gray Soil	Gray: Sand–Clay	833	09/29/92	28.5	12	<.025	<.025	<.025	<.025	Pass
N22297	West Pit @ 10 Foot, Black Soil	Black: Fine Grain	837	09/29/92	171	27	<.025	<.025	<.025	<.025	Pass
N22298	East Pit @ 10 Foot	Black: Rocky	843	09/29/92	6453	2000	<.025	<.025	<.025	0.029	Pass
N22299	20 Foot outside W. Berm, Above Clay	Black: Sandy	853	09/29/92	979	369	NR	NR	NR	NR	Pass
N22300	20 Foot outside W. Berm, Below Clay	Brown: Clay	900	09/29/92	75.3	7	<.025	<.025	<.025	0.041	Pass
N22301	20 Foot outside W. Berm, Top of Clay	Grey: Clay	902	09/29/92	52.8	7	<.025	<.025	<.025	<.025	Pass
N22302	Background Soil	Brown: Sandy	913	09/29/92	177	10	<.025	<.025	<.025	<.025	Pass
N22306	Main Soil Pile, North – Bottom	Black/Gray Sand	1530	09/30/92	>10,000	6400	<.025	0.1	0.049	0.5	NR
N22307	Main Soil Pile, Middle– Bottom	Black/Gray Sand	1535	09/30/92	>10,000	6954	0.028	0.13	0.058	0.49	NR
N22308	Main Soil Pile, South – Bottom	Black/Gray Sand	1540	09/30/92	>10,000	7352	<.025	0.049	0.032	0.26	NR
N22310	North Pile side 1 – Core	Gray, Fine Sand	1048	10/02/92	>5,000	3400	<.025	<.025	<.025	0.03	NR
N22311	North Pile side 2 – Core	Gray, Fine Sand	1100	10/02/92	>10,000	5600	<.025	<.025	0.026	0.2	NR
N22312	Middle Pile side 1 – Core	Gray, Fine Sand	1113	10/02/92	>10,000	6500	<.025	<.025	<.025	0.1	NR
N22313	Middle Pile side 2 – Core	Gray, Fine Sand	1125	10/02/92	>10,000	8200	<.025	0.028	0.091	0.59	NR
N22314	South Pile side 1 – Core	Gray, Fine Sand	1142	10/02/92	>10,000	7000	<.025	<.025	0.027	0.15	NR
N22315	South Pile side 2 – Core	Gray, Fine Sand	1152	10/02/92	>10,000	7100	<.025	0.027	0.079	0.46	NR
N22316	Bottom of Pit – 10 Foot, South Wall	Gray, Clay	1212	10/02/92	280	<5	<.025	<.025	<.025	<.025	NR
N22317	Background Soil	Brown: Sandy	1220	10/02/92	118	79	<.025	<.025	<.025	<.025	NR

NOTES:
NR = Not Run, Sample Problems: Not enough, too wet, etc.

AP

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

1912

DRUG FREE

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

October 19, 1992

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-242-303

Ms. Sandra D. Miller
Sr. Environmental Scientist
El Paso Natural Gas Company
P.O. Box 4990
Farmington, New Mexico 87499

RE: FLARE PIT CLOSURE PLAN MODIFICATION
EPNG SAN JUAN RIVER PLANT
SAN JUAN COUNTY, NEW MEXICO

Dear Ms. Miller:

The New Mexico Oil Conservation Division (OCD) has completed a review of the El Paso Natural Gas Company (EPNG) October 12, 1992 correspondence requesting permission to modify EPNG's September 16, 1992 "FLARE PIT CLOSURES AT SAN JUAN RIVER PLANT" which was approved by OCD on September 28, 1992. The modification seeks to remediate petroleum contaminated soils onsite using landfarming techniques instead of removing the soils for offsite disposal.

The above referenced request to modify the previously approved flare pit closure plan is hereby approved with the following conditions:

1. Only contaminated soils generated during the closure of the San Juan River Plant flare pits will be landfarmed onsite.

2. The location of the landfarm, identified by you in our October 16, 1992 conversation, will be the 15 acre area west and south of the south flare pit.

3. The landfarm will be operated according to the attached operating conditions.

Please be advised that OCD approval does not relieve EPNG of liability should the landfarm operation result in actual pollution of surface waters or the environment actionable under other laws and/or regulations. In addition, OCD approval does not relieve you of liability for compliance with any other laws and/or regulations.

If you have any questions please contact me at (505) 827-5885.

Sincerely,

Will C. Olson

William C. Olson
Hydrogeologist
Environmental Bureau

Attachment

xc : Denny Foust, OCD Aztec District Office

ATTACHMENT TO OCD PERMIT APPROVAL
EL PASO NATURAL GAS COMPANY
SOILS LANDFARM
SAN JUAN RIVER GAS PROCESSING PLANT
(October 19, 1992)

LANDFARM OPERATION

1. The landfarm area will be bermed to prevent runon or runoff to or from the landfarm area.

2. All contaminated soils will be spread and disked within 72 hours of receipt.

3. Soils will be spread on the surface in six inch lifts or less.

4. Soils will be disked a minimum of one time every two weeks (biweekly) to enhance biodegradation of contaminants.

5. Successive lifts of contaminated soils will not be spread until a laboratory measurement of Total Petroleum Hydrocarbons (TPH) in the previous lift is less than 100 parts per million (ppm), and the sum of all aromatic hydrocarbons (BTEX) is less than 50 ppm, and the benzene is less than 10 ppm. Comprehensive records of the laboratory analyses and the sampling locations will be maintained by EPNG. Authorization from the OCD will be obtained prior to application of successive lifts.

6. Moisture will be added as necessary to control blowing dust and to enhance bioremediation. There will be no ponding, pooling or run-off of water allowed. Any ponding of precipitation will be removed within seventy-two (72) hours of discovery.

7. Enhanced bio-remediation through the application of microbes (bugs) will only be permitted after prior approval from the OCD. Request for application of microbes must include the location of the area designated for the bio-remediation program, composition of additives, and the method, amount and frequency of application.

8. No free liquids or soils with free liquids will be accepted at the site.

9. Comprehensive records of all material disposed of at the facility will be maintained by EPNG. The records for each load will include: 1) the origin; 2) analysis for hazardous constituents, if required; 3) transporter; and 4) exact cell location.

TREATMENT ZONE MONITORING

1. One (1) background soil sample will be taken from the center portion of the landfarm two (2) feet below the native ground surface. The sample will be analyzed for total petroleum hydrocarbons (TPH), general chemistry, and heavy metals using approved EPA methods.

2. A treatment zone not to exceed two (2) feet beneath the land farm will be monitored. A minimum of one random soil sample will be taken from each individual cell, with no cell being larger than five (5) acres, six (6) months after the first contaminated soils are received in the cell and then quarterly thereafter. The sample will be taken at two to three (2-3) feet below the native ground surface.

3. The soil samples will be analyzed for TPH, volatile aromatic organics (BTEX) quarterly and general chemistry and heavy metals annually using approved EPA methods.

4. After obtaining the soil samples the boreholes will be filled with an impermeable material such as bentonite cement.

REPORTING

1. Analytical results from the treatment zone monitoring will be submitted to the OCD Santa Fe Office within thirty (30) days of receipt from the laboratory.

2. The OCD will be notified of any leak, break, spill, blow out, or fire or any other circumstance that could constitute a hazard or contamination in accordance with OCD Rule 116.

CLOSURE

When the facility is to be closed no new material will be accepted. Existing soils will be remediated until they meet the OCD standards in effect at the time of closure. The area will then be reseeded with natural grasses and allowed to return to its natural state. Closure will be pursuant to all OCD requirements in effect at the time of closure.

KWB&A

ENVIRONMENTAL SCIENCE & ENGINEERING

FINAL CLOSURE PLAN FOR WASTEWATER IMPOUNDMENTS AND FLARE PITS AT EL PASO NATURAL GAS COMPANY'S SAN JUAN RIVER PLANT

File Copy

prepared for

El Paso Natural Gas Company
El Paso, Texas

by

K. W. Brown & Associates, Inc.
500 Graham Rd
College Station, Texas 77845

RECEIVED

MAY 06 1991

OIL CONSERVATION DIV.
SANTA FE

April 1991

Sidney H Johnson

Sidney H. Johnson
Project Manager/QC Reviewer

Wayne Crawley

W. Wayne Crawley
Director of Operations

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EXECUTIVE SUMMARY

Closure of the wastewater impoundments and flare pits and remediation of the salt-affected soils at El Paso Natural Gas Company's San Juan River Plant can be accomplished by limited excavation and the installation of a soil cover, provided that the water level of the induced water table is lowered. The primary objective of the closure effort will focus on the need to isolate salts in the subsurface. These recommendations are supported by the field data, environmental setting, and a bench-scale study.

A geophysical survey using a Geonics EM38 Ground Conductivity Meter (EM38), and soil sampling were used to define quantitatively the extent of the salt-affected soils in the drainage area. This field exercise defined an outer boundary for an excavation area of approximately 24 acres. The data also illustrate a soil profile impacted by salts to a depth exceeding 4 ft, which makes extensive excavation economically impractical. Therefore, the proposed excavation in the drainage area will be limited to the upper 6 in. of soil, which will effectively remove the most highly impacted soils. The excavated soils can be buried in the retired wastewater impoundments.

The environmental results in the formation of saline soil horizons at depths of 1–6 ft. The formation of these saline horizons is the direct result of limited rainfall and the type of soils present. Remedial activities presented in this report are designed to simulate naturally occurring soil conditions.

A bench-scale study determined that the potential for capillary rise in the local soils was in excess of 2 ft when the soil was in contact with a shallow water table. Hence, closure of the site will require that the artificially high water table resulting from the leaking wastewater impoundments be eliminated before closure can begin. It is also recommended that the north raw water impoundment be closed to further eliminate the potential for a high water table.

Closure of the wastewater impoundments and the salt-affected drainage will require some recontouring and the installation of a soil cover system. The cover system design will include two layers: the first will be a sandy textured soil from borrow site #1 or #3, and the second will be finer textured soil from borrow site #2. This design will create a slight textural discontinuity that will aid in moisture retention.

1.0 INTRODUCTION

This plan addresses the final closure activities developed by K. W. Brown & Associates, Inc. (KWB&A) for the wastewater impoundments and flare pits at El Paso Natural Gas Company's (EPNG) San Juan River Plant (SJRP), which is located in Section 1, Township 29 N, Range 15 W, San Juan County, approximately 8 miles west of Farmington, New Mexico (Figure 1). A total of five units will be addressed in this plan: wastewater impoundments 1, 2, and 3 and the north and south flare pits (Figure 2). Additionally, areas that have been affected by the operation of the wastewater impoundments (i.e., surface soils downgradient of the north impoundments) will be addressed. This closure plan is arranged in a format that includes discussions of the regulatory considerations, investigation efforts, closure methodology, cover system design, and post-closure care.

This document combines all closure recommendations and data presented to EPNG into one final closure report. This closure report will define the final methods and procedures that were ultimately selected for final closure of the impoundments and pits. It is not within the scope of this plan to detail daily activities, describe specific types of equipment used to implement closure, or present engineering specifications for all aspects of closure activities to be performed at the site. Though some specific details are offered, this closure plan is designed to allow EPNG and the state agencies the flexibility to address specific conditions as they arise.

The primary objective of the closure effort will focus on isolating salts in the subsurface. Additional closure objectives will concentrate on the presence of organic constituents, development and implementation of a program to ensure the long-term stability of the closed units.

Closure activities proposed for the wastewater impoundments and the salt-affected drainage will include shallow excavation (6 in. depth), recontouring of the surface, and the installation of a soil cover system. The north and south flare pits will be re-excavated in much the same manner depending on the amounts and type of wastes present.

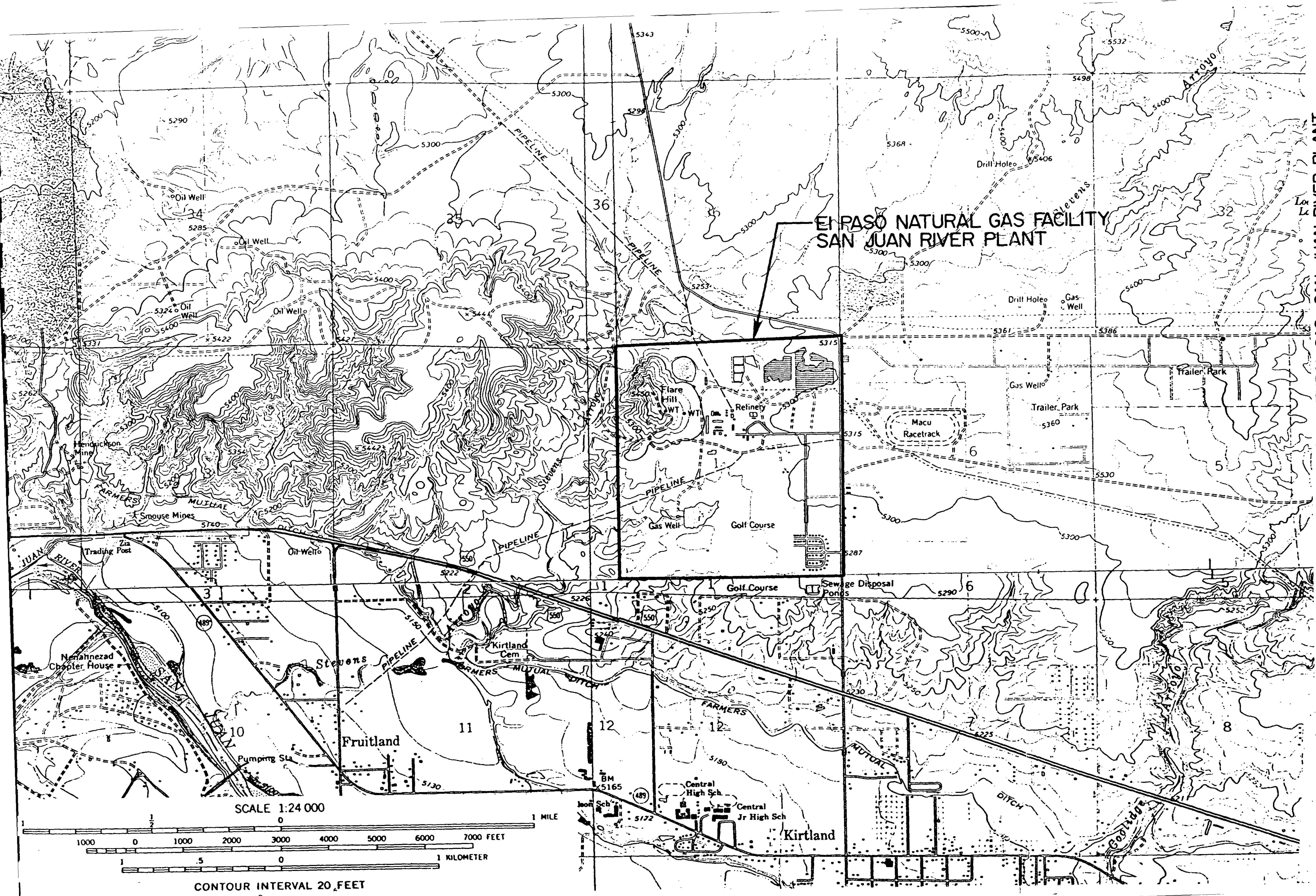
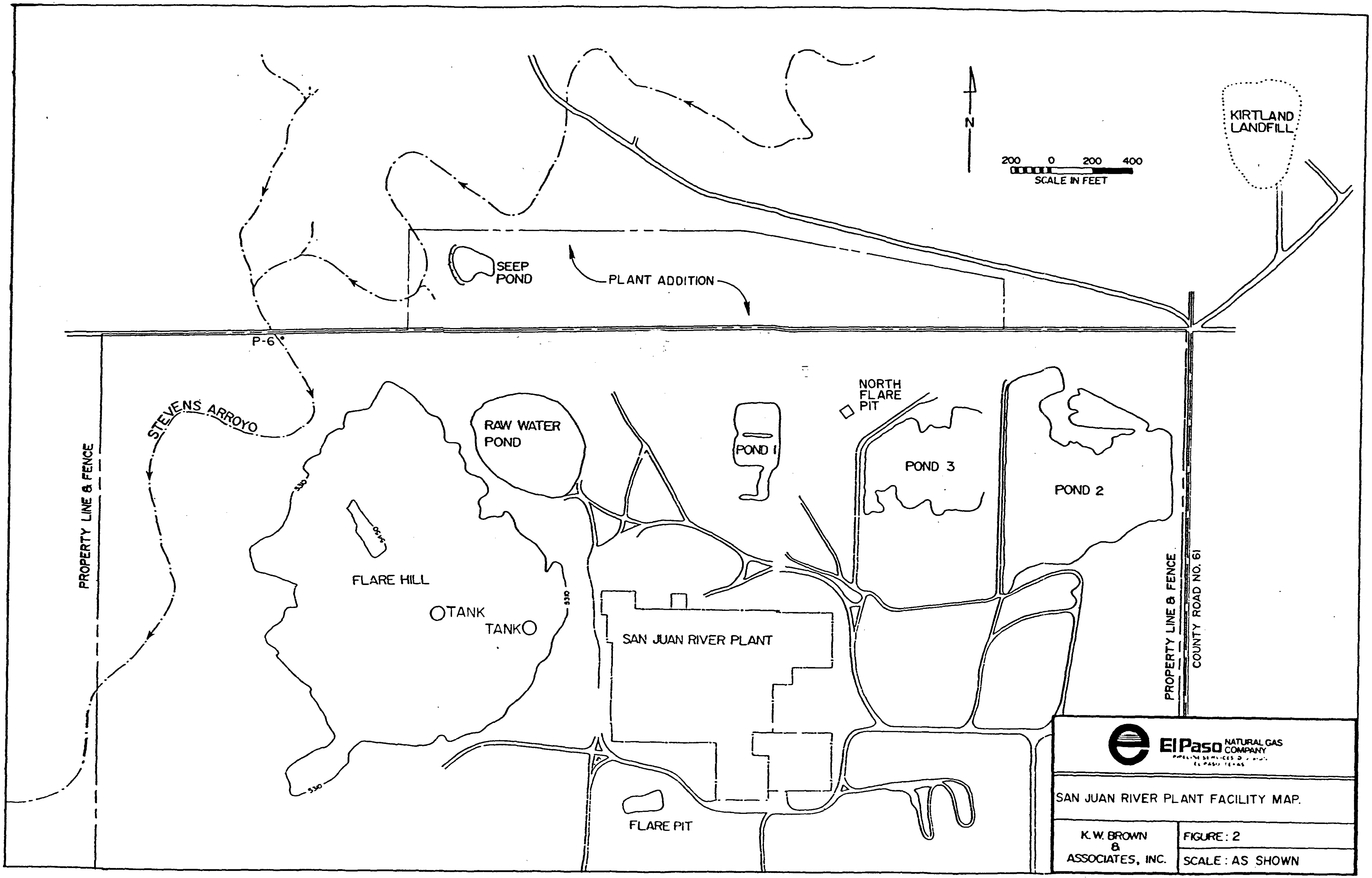


FIGURE I LOCATION OF El PASO NATURAL GAS, SAN JUAN RIVER PLANT.



SAN JUAN RIVER PLANT FACILITY MAP.

K.W. BROWN & ASSOCIATES, INC.

FIGURE: 2

SCALE: AS SHOWN

2.0 BACKGROUND INFORMATION AND SCOPE

This section defines the magnitude of the closure effort, addresses regulatory requirements that govern the closure of the wastewater ponds and flare pits, and includes a brief discussion on past operation of the waste management units.

2.1 UNIT DESCRIPTION AND HISTORY

The three wastewater ponds at the SJRP cover approximately 33 acres and have a combined capacity of 98.2 acre-feet. As wastewater was discharged, it was received by pond 1, then pumped to pond 2, and if necessary, allowed to flow by gravity to pond 3. All wastewater handled at the ponds and flare pits was nonhazardous.

Over the past 30 years, these impoundments have received both contact and noncontact wastewaters. Recently, discharge to the impoundments has been limited to wastewater from noncontact sources. Sources of noncontact wastewater received by the impoundments included boilers, water treatment, cooling towers, and stormwater. Contact wastewaters from scrubber/separators, dehydration, the gasoline plant, and the sulfur plant were discharged to the ponds in the past. All contact wastewater is now discharged to a double-lined surface impoundment, which is equipped with a leak detection system.

2.2 ENVIRONMENTAL FACTORS

One of the objectives of the closure plan is to present a method by which the salts (and other waste constituents) present at the site can be isolated in the subsurface. To prevent migration of the salts or other waste constituents following closure, it is important to consider avenues that could lead to migration either at the surface or through leaching. Therefore, climate, hydrogeology, and stormwater runoff are reviewed in view of their potential to influence waste and especially salt migration. Additionally, a brief description of local land use is presented to illustrate that closure activities will not adversely impact daily activities in the surrounding areas.

2.2.1 Climate

The climatic setting at the site is characterized by low amounts of precipitation, a high evaporation potential, temperate winters, and hot summers. The mean annual precipitation is 7.6 in. (mean annual snowfall is 12 in.) and the potential evaporation rate, as measured from a free water surface (lake evaporation), is 46.2 in. per year. These values readily illustrate the strongly negative water balance at the site. Temperatures for the area are characterized by 150 days during which the mean minimum daily temperature is 32°F or less and 60 days for which the maximum temperature is equal to or exceeds 90°F. Table 1 illustrates a simple water balance for the area and includes representative temperatures.

The significance of the water balance is its influence on local groundwater recharge. Intuitively, minimal rainfall and a strongly negative water balance indicate that recharge is limited, but this alone does not define the magnitude of recharge or verify that recharge is not occurring. Therefore, additional data are required to quantify groundwater recharge.

Work performed at the site during the Phase I investigation for the land application system included the collection of deep cores (90 ft) using a hollow-stem auger. Samples collected from the cores were submitted to Dr. William Stone at the New Mexico Bureau of Mines and Minerals Resources for analysis to determine the native rate of recharge for the area. Results of the analysis from these cores indicate the native recharge rate is approximately 0.03 in./yr. for the alluvial sediments documented on the southern side of the facility (Stone, 1987). The recharge rate is not anticipated to exceed this value in the area of the north units, and may very well be less due to the more abundant clay (shale) sediments on the north side of the facility.

Table 1. Water balance and temperature ranges for the SJRP.

Month	Mean[a] Precip. (in.)	Lake[a] Evap. (in.)	Precip.-Evap. Balance (in.)	Temperature [b] Min. (°F)	Max. (°F)	Avg. (°F)
January	0.65	0.77	-0.12	15	42	30
February	0.47	0.82	-0.35	20	50	31
March	0.62	3.04	-2.42	34	58	40
April	0.52	5.13	-4.61	33	70	50
May	0.45	5.86	-5.41	42	80	60
June	0.30	7.29	-6.99	50	88	68
July	0.70	7.01	-6.31	61	92	78
August	0.98	6.22	-5.24	58	90	74
September	0.84	4.63	-3.79	49	82	63
October	0.87	3.04	-2.17	38	71	52
November	0.53	1.63	-1.10	22	55	40
December	0.68	0.80	-0.12	20	43	32
Annual	7.61	46.24	-38.63	36.8	68.4	51.5

[a] Values from EPNG comments to OCD, April 1988.
[b] Values from NOAA Climatic Atlas, 1979.

2.2.2 Hydrogeology

Investigations associated with the land application site have identified a piezometric divide between the wastewater ponds and the south flare pit. Because this divide is reasonably well documented, the hydrogeology of the northern units will be considered separately from the south flare pit.

North Units

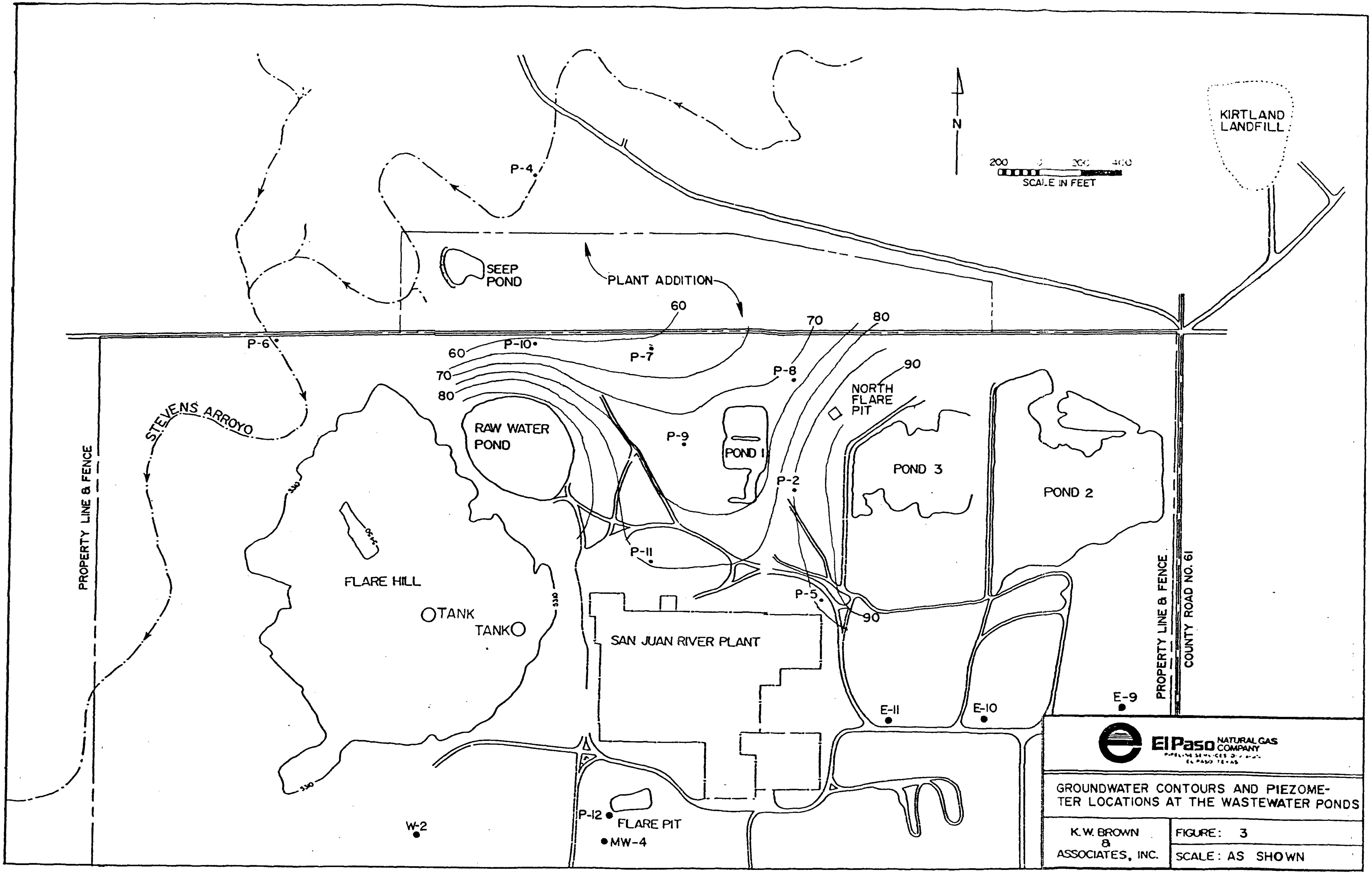
The hydrogeology of the north units is based on interpretations offered in the land application feasibility study, borings conducted during the installation of the "P" monitoring wells around the wastewater ponds, and logs provided by San Juan County concerning geologic investigations at the Kirtland landfill. From the available information, it appears that groundwater on the north side of the divide naturally occurs at depths in excess of 36 ft. However, because the ponds once represented a source of recharge, an artificial water table was created at or slightly below the ground surface. The ponds are now partially drained and with the completion of drainage and drying time, it is anticipated that the artificial water table will dissipate.

Flow of the "artificial groundwater" follows surface topography to the northwest and the configuration of the contours is influenced by groundwater mounding caused by the ponds (Figure 3). During the land application feasibility study, it was determined that some "groundwater" was moving in a southerly direction crossing the divide in the area of piezometer E-11. However, this probably represents a small percentage of the total flow. During closure activities, depth-to-water measurements will be taken in the piezometers and changes in groundwater flow direction will be documented.

In the area of the north wastewater ponds, it appears that a clay/shale zone is acting as a confining layer that perches the infiltrating water near ground surface. As the water moves laterally along this zone, capillary action draws the water to the surface and the precipitating salt causes the formation of a salt crust.

South Flare Pit

The hydrogeology in the area of the south flare pit appears to be very similar to the setting described in the land application reports (KWB&A, 1987a, 1987b). The surface geology is characterized by sandy Quaternary alluvium that overlies gray shale. The log of monitoring well 4 (MW-4) and piezometer W-2 indicates that the alluvium is approximately 53 ft thick and is underlain by gray shale. The shale appears to represent a confining layer along which groundwater flows.



El Paso NATURAL GAS COMPANY

GROUNDWATER CONTOURS AND PIEZOMETER LOCATIONS AT THE WASTEWATER PONDS

K.W. BROWN & ASSOCIATES, INC.

FIGURE: 3

SCALE: AS SHOWN

The depth-to-water measurements for MW-4 and W-2 are 47 and 53 ft, respectively. Groundwater flow in the area, as defined by MW-4 and piezometers W-2 and P-12, indicates that movement is to the southwest, which is consistent with surface topography. Depth-to-water measurements during closure activities will be gathered to further verify the southwesterly groundwater flow direction.

2.3 STORMWATER RUNOFF

As per New Mexico Oil Conservation Division's (NMOCD) request, EPNG completed a watershed study, including a computer simulation of rainfall/runoff conditions, of the salt-affected area to the north of the SJRP; this area lies within the Stevens Arroyo watershed. Following this study, EPNG purchased this property from the state. The impetus for conducting this study was twofold: (1) to generate expected stream flow conditions for a predetermined climatic event and (2) to aid in the development of stormwater management techniques during closure activities. Appendix A describes the hydrologic setting of Stevens Arroyo, the hydrologic data available to EPNG, a detailed description of the computer program used to simulate rainfall/runoff conditions, and findings obtained as a result of the effort.

2.4 SURROUNDING LAND USE

Land to the north and west of the facility is owned by the State of New Mexico and is currently under lease to a private individual for livestock grazing. To the east are several small commercial buildings, the Kirtland city landfill, and scattered residences. To the south are several residences and additional commercial buildings. Figure 4 illustrates local land use.

It is unlikely that closure activities will result in a release that would impact any of the local residences. However, a release from the south flare pit could affect groundwater that flows to the southwest, where several residents pump groundwater. The most likely avenue followed by a release from the north units would be down Stevens Arroyo to the San Juan River.

2.5 REGULATORY CONSIDERATIONS

Discussions with NMOCD, New Mexico Environmental Improvement Division (NMEID), and the U.S. Environmental Protection Agency (EPA) Region VI personnel indicate that NMOCD has jurisdiction over natural gas processing plants in New Mexico. However, NMOCD has no formal guidance for closure of surface impoundments. It is the intent of EPNG to provide closure of these units that would be deemed acceptable, in both technical and regulatory arenas.

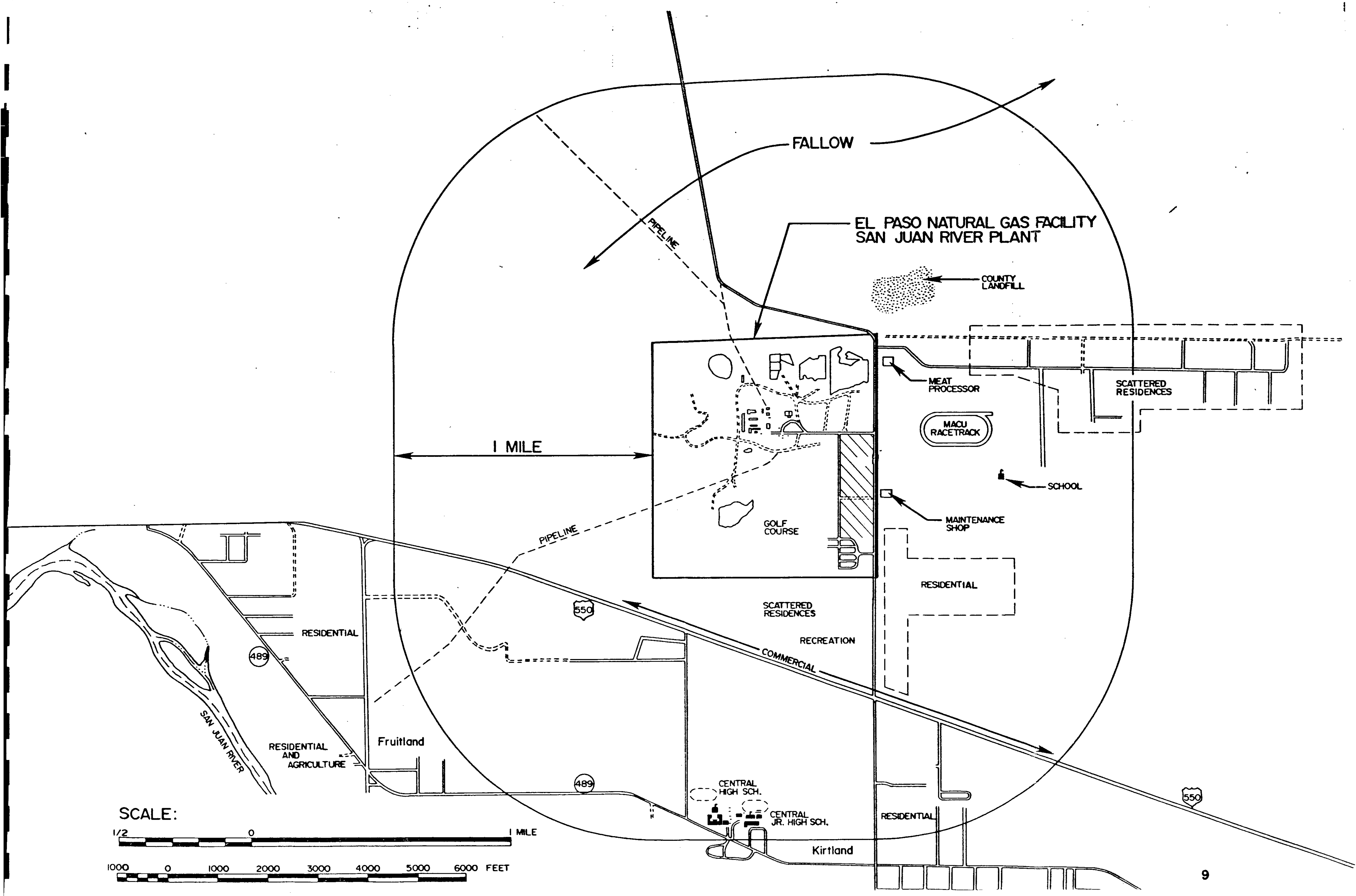


FIGURE 4. SURROUNDING LAND USE.

3.0 INVESTIGATION EFFORTS

As stated previously, the NMOCD does not have formal guidelines for the closure of waste units at natural gas facilities. Therefore, it is left to the owner/operator of facilities to compose closure criteria that NMOCD will find acceptable.

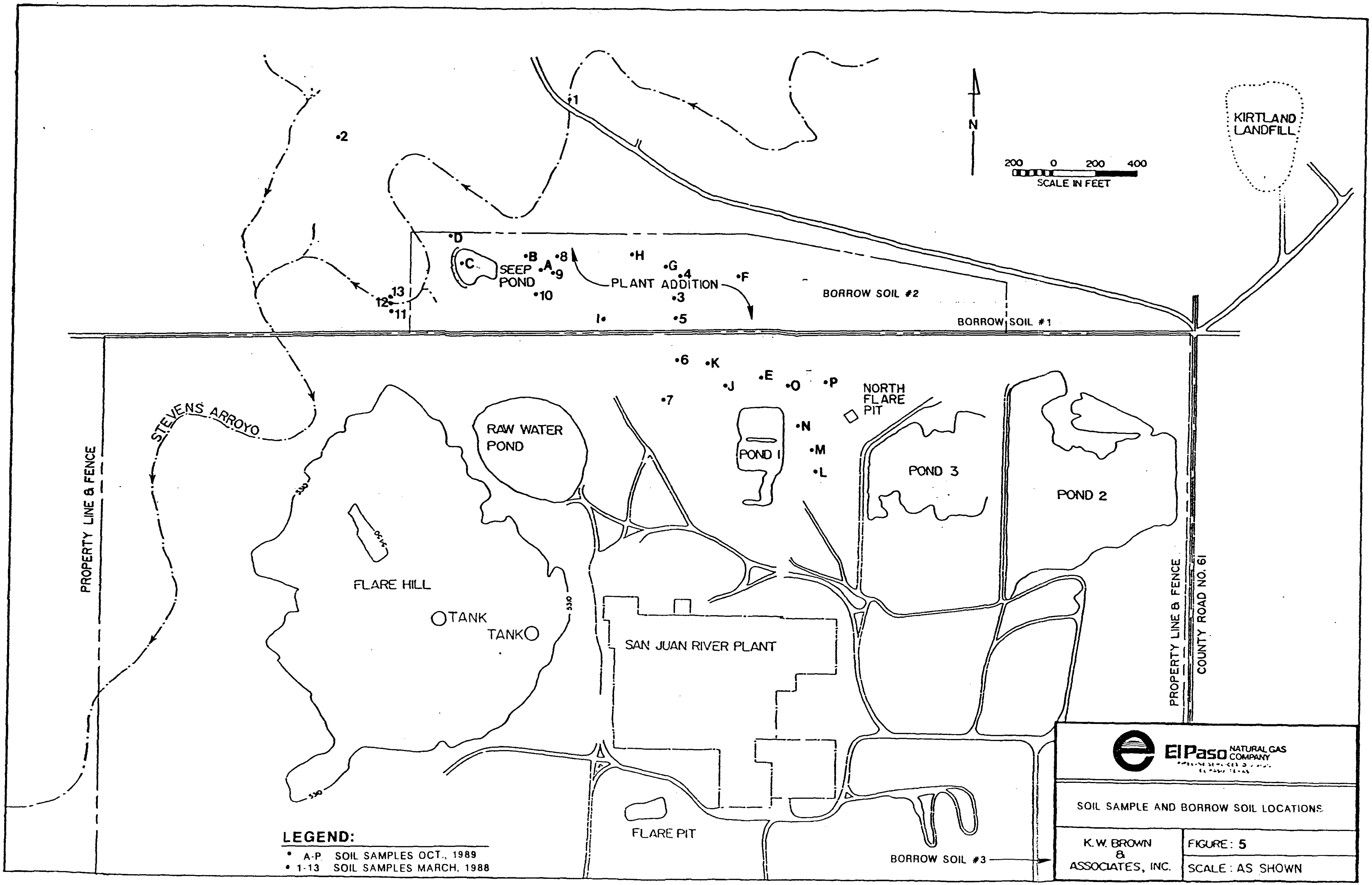
Before proposing closure criteria, it should be remembered that the primary objective of these closure activities is to isolate the salts at the site to prevent future migration and the ultimate impact that migrating salts would have on the San Juan River. It is not within the scope of the closure activities to return all of the affected areas to background conditions. Hence, the closure methods will be based on preventing the likelihood of future migration, rather than restoring the site to its "native state." Characterization of the affected areas was accomplished through soil sampling and analysis in conjunction with a geophysical field survey and a bench-scale capillary rise laboratory study.

3.1 SOIL SAMPLING AND ANALYSIS

Two separate soil sampling events were performed to characterize the magnitude to which soils in the drainage basin below the wastewater impoundments were affected by leaching salts (Figure 5). The first set of soil samples was collected in March 1988 to characterize the chemistry of soils in the drainage basin below the impoundments. These samples received numeric identifiers (e.g., 1:0-1 denotes sample 1, depth 0–1 ft) (KWB&A, 1988). The second set of soil samples was collected in October 1989 for correlation of the EM38 survey to the soil electrical conductivity (EC).

Both soil sampling events were conducted using a standard hand auger to collect samples at 1-ft soil intervals. The maximum soil sampling depth was 4 ft. During the 1988 soil sampling event, the impoundments had not begun to dry; therefore, the soils situated topographically downgradient from the impoundments were saturated, which made sampling very difficult. However, the impoundments had essentially dried out by the 1989 soil sampling event, resulting in more efficient sampling conditions.

Laboratory analyses for the 1988 soil samples illustrate high EC values as well as high values for constituents found in inorganic salts (e.g., sodium, calcium, magnesium, carbonate, chloride, potassium, and sulfate). Other than the elevated concentrations of salts at the sur-



LEGEND:

- • A-P SOIL SAMPLES OCT., 1989
- • 1-13 SOIL SAMPLES MARCH, 1988

El Paso NATURAL GAS COMPANY

SOIL SAMPLE AND BORROW SOIL LOCATIONS

K.W. BROWN & ASSOCIATES, INC.	FIGURE: 5
	SCALE: AS SHOWN

face, no clear trends with respect to depth as a function of EC were noted. EC values remain high throughout the sampled soil profile

The laboratory results for the 1989 soil samples, once again, do not illustrate a clear trend in terms of soil EC gradients. Furthermore, the magnitude of the EC values is essentially the same as those of the 1988 samples (Appendix B).

3.2 GEOPHYSICAL SURVEY

A geophysical survey designed to collect EM conductivity measurements was performed in October 1989 by KWB&A in the salt-affected drainage basin area. The objective of this field investigation was to both quantitatively and qualitatively define the magnitude and aerial extent of the salt-affected area. EM conductivity surveys are well-recognized and popular investigative tools for the delineation of salt-affected soils.

The EM data were collected using a Geonics EM38 Ground Conductivity Meter which measures apparent ground conductivity in units of mmhos/m. Individual data points were recorded using a data logger that interfaces with the EM38.

The EM38 is capable of looking into a soil profile to a depth of 5 ft when in the vertical dipole position, which was the position used in this investigation. A reading is taken with the EM38 instrument placed on the ground surface. The reading is directly proportional to the relative EC of the soil and can be influenced by the soil texture, amount of salt present, and buried metal objects (e.g., pipelines).

Interpretation of the EM38 data, in part, consisted of contouring a map of the values collected along the transects and correlating individual EM38 measurements with EC analytical values for soil samples collected in the study area (KWB&A, 1989). In addition to contouring the EM38 values, the surface area of segregated EM levels was also calculated (Table 2).

3.3 CAPILLARY RISE STUDY

A major concern of the closure effort is the upward migration of salts. To quantify the upward migration potential of the soil, a bench-scale study was undertaken to determine if a capillary barrier was needed. The principle behind a capillary barrier is that a textural discontinuity in a soil profile will restrict the vertical movement of moisture. Hence, installing a capillary barrier is a method by which upward vertical migration can be eliminated (Brady, 1974).

The potential for capillary rise was determined empirically via a bench-scale experiment using two local soils that could be used to construct the cover system. Evaluation of climatic

Table 2. Surface areas for EM38 isopleth lines.

EM38 Value (mmhos/m)	Projected Surface Area[a] Exclusive (acres)	Nested (acres)	Estimated Soil Saturated Paste EC[b] (mmhos/cm)
200 - 300	19	43	15.7
300 - 400	12.7	24	21.2
400 - 500	6.9	11.3	28.7
500 - 600	2.9	4.4	38.0
600 - 700	1.1	1.5	49.2
700 - 800	0.2	0.4	62.4
800 - 900	0.15	0.2	77.4
900 - 1,000	0.05	0.05	94.3

[a] Surface area calculated as a planar surface.
[b] EC values correspond to upper EM38 values.

factors that influence the potential for salt migration was extracted from prior reports prepared for the land application study (KWB&A, 1987a, 1987b).

3.3.1 Capillary Rise Potential

A primary consideration in the remediation of the wastewater ponds and the salt-affected drainage is to prevent future migration of salt from the site to the San Juan River. This closure plan calls for excavating the surficial soils in the drainage, which are heavily affected with salt, and placing them in the wastewater ponds. Once in place, a cover system would be constructed over the wastewater ponds and portions of the drainage to limit the infiltration of precipitation and the subsequent vertical migration of salt downward to groundwater or upward to be redeposited at the soil surface.

Part of the closure effort will entail the construction of a cover system to isolate the salts present in the soils found in the drainage basin and the pond bottoms. To this end, it was desirable to find a local source for soil to be used in the cover system. Hence, three separate soil samples were collected from potential borrow sites (Figure 5). In addition to identifying soils that are suitable for use in the cover system, it is may be possible to use the different borrow soils to construct a textural discontinuity in the soil cover (see Section 5.0).

Testing of the three potential borrow soils included textural analysis and EC. Based on these results, borrow soil #2 was omitted from further testing because of its finer-grained texture and its higher EC (2,980 µmhos/cm) relative to the other borrow soils (data included in Appendix B). Borrow soils #1 and #3 were packed into 2-ft-long, 3-in.-diameter clear Plexiglas columns, which were in turn placed in a free water source containing rhodamine dye. Timed observations were taken during the course of the experiment to measure the capillary rise potential.

The bench-scale study clearly illustrates that if the cover system were constructed of a 2-ft borrow soil layer and if this layer were exposed to a free groundwater source, then the potential exists to wick water, as well as any salts that may be present, to the surface. With the closure of the wastewater ponds and the removal of the hydraulic source, these conditions are not expected to be present.

3.3.2 Physiography

Because capillary bench-scale study clearly indicates the potential for upward salt migration exists under certain circumstances, the local setting must be examined to determine if the circumstances necessary for capillary rise could occur. Characteristics concerning the local setting that need to be examined include the depth to groundwater, occurrence of native saline horizons, and water balance.

3.3.2.1 Depth to Groundwater

The capillary rise study illustrated that more than 2 ft of borrow soil would be needed if the bottom of the soil column were in contact with a free water surface (i.e., the water table). It can be demonstrated that the water table is subsiding as a result of removing the hydraulic head from the wastewater ponds. Thus, it is reasonable to argue that capillary rise will occur only if precipitation is sufficient to support a natural elevated water table.

Observations during the 1988 soil sampling event clearly illustrated that soils in the drainage were saturated and the water table was sufficiently near the surface to preclude the collection of some 3–4-ft samples. Collection of the 1989 soil samples generally illustrated that the soils were not saturated and the water table was deeper than noted the previous year. Current site conditions point to a native water table at a depth in excess of 36 ft, which is more than adequate to allow the salt-affected soil to be isolated using a soil cover system.

3.3.2.2 Saline Soil Horizons

Soils in the area are identified in the San Juan County Soil Survey as the Badland-Monierco-Rock (BB) outcrop complex and the Blancot-Notal (BT) Association. The BB soils are characterized as having an annual wetting depth of about 11 in. where a native vegetative cover exists, whereas the BT soils have an average annual wetting depth of 6–16 in. (Soil Conservation Service [SCS], 1980).

The wetting depth of a soil is important to this project for two reasons; first, if moisture cannot penetrate the soil profile it is not likely that salts will migrate, and second, if a wetting front exists, then it is likely that a saline horizon will develop within the soil profile, not at the soil surface (Brady, 1974).

Saline horizons have been documented in local soils during the land application study (KWB&A, 1987a) and a saline horizon was noted during the collection of borrow soil #1. The presence of saline horizons in the soil profile across the area strongly indicates the downward movement of salts to a depth that corresponds to the annual wetting front.

3.3.2.3 Water Balance and Salt Migration

The annual wetting front mentioned Section 2.2.1 is directly related to the local water balance, which was determined to be negative during the land application study (KWB&A, 1987a, 1987b). Average annual precipitation was calculated to be 7.6 in. and the evaporation potential was estimated at 46.2 in. (Table 1). This skewed water balance lends credibility to the identified wetting front depths.

In addition to considering the vadose zone interaction of precipitation and salt movement, it is worthwhile to re-evaluate the calculations offered by Dr. William Stone (Stone, 1987) concerning the migration of salt to groundwater for the area and the computer modeling exercises conducted for the land application study. Dr. Stone's migration calculations were based on soil samples collected during the land application study and a procedure he developed at the New Mexico Bureau of Mines and Mineral Resources. His calculations indicate local recharge to groundwater is on the order of 0.03 in. annually (Stone, 1987). This empirically derived recharge rate suggests vertical migration of salts from the areas to be remediated will, for all practical purposes, not occur.

Modeling simulations conducted to determine if wastewater could be irrigated, without inducing migration of salt to the groundwater, were performed as a precursor to implementing the land application system. Results of the modeling indicated that significant quantities of wastewater could be irrigated, in addition to the annual precipitation, without increasing the native groundwater recharge rate (KWB&A, 1987a). Therefore, it can be stated with a reasonable degree of certainty that recharge to groundwater from the remediated salt-affected areas will be negligible, if any occurs at all.

3.3.3 Summary and Discussion

The results of bench-scale testing to empirically derive the capillary rise potential for borrow soils that could be used to construct the cover system clearly indicate that if a free water surface is present, then water and salts will be wicked through the soil cover system. Review of the local setting indicates that the water balance, soils, and expected depth to water are such that this situation will not occur in the EPNG site area. However, this is contingent upon removing the artificial water table caused by the wastewater impoundments and the north raw water impoundment. Information gathered during the land application study and observations during the field activities associated with this project indicate that local conditions are favorable for the formation of a saline horizon in the subsoil. Thus, using a soil cover of 18 in. (as discussed in Section 4.4) in this area will be an effective measure in isolating an elevated salt layer.

4.0 CLOSURE

Closure activities at the EPNG site will entail groundwater monitoring, soil and sludge sampling and analysis, and unit-specific closure protocols developed for the drainage basin, the wastewater impoundment, and the flare pit.

4.1 GROUNDWATER MONITORING

Prior to initiating closure activities, the groundwater in the drainage basin area must be monitored using the piezometers present to determine that a depth-to-water measurement of approximately 15 ft is maintained. Soils of the textural class found in the drainage basin area will require a depth to water of 15 ft to ensure that capillary rise will not reach the surface (Brown, 1991). Results from the bench-scale study indicate that capillary rise through a soil cover constructed from potential borrow sites is possible. The conditions needed to cause capillary rise would be saturated conditions near the soil surface (i.e., shallow water table). However, it appears the shallow water table that persisted at the site was the direct result of water leaching from the wastewater impoundments. Therefore, by removing the hydraulic head from the impoundments, it is expected that the water table will drop to acceptable levels. Recent observations from the site indicate that the water table is responding favorably to the reduced hydraulic head. If necessary, measures can be taken to ensure that the ponds remain empty and the groundwater lowered to a level that will permit closure. The lined pond at SJRP can be used to evaporate any excess water.

The efforts made to lower the water table would be compromised, however, by the reactivation of the north raw water impoundment. Evidence at the site clearly indicates water from this impoundment leaches into the salt-affected drainage basin area. It is reasonable to assume that continued operation of the raw water impoundment will support an elevated water table in some portion of the drainage. Therefore, in order to consider using a soil cover system, EPNG will need to remove the raw water impoundment from service.

4.2 SLUDGE AND SOIL SAMPLING AND ANALYSIS

Sludge and soil samples were collected by EPNG on January 18, 1991, for analysis from the wastewater impoundment bottoms and the areas surrounding the wastewater impoundments.

These samples were collected as the initial phase of closure activities to assess the condition of the site. To determine the effectiveness of reclamation efforts, sludge and soil samples will also be collected following implementation of closure activities. These samples will serve to determine if additional work is required and will document the condition of the site following closure activities. Methods used for collecting the samples and the analytical parameters selected are discussed in the following sections.

4.2.1 Sampling Methodology

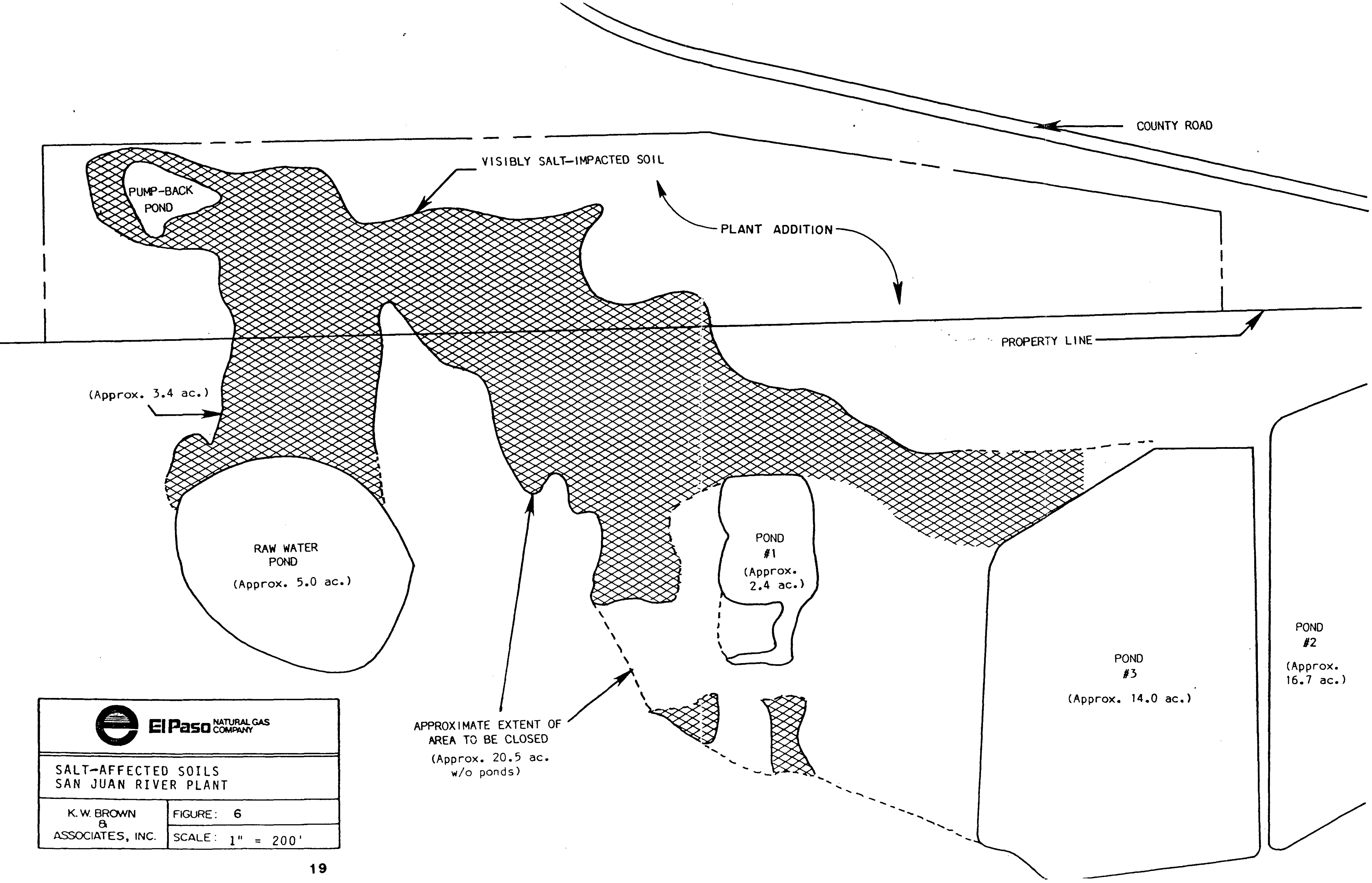
Impoundments 1, 2, 3, and the north flare pit (north units) will be discussed as one area, and the south flare pit will be considered separately. In addition to sludge and soil samples collected from the affected drainage basin and wastewater impoundment bottoms, background soil samples were collected. Background samples were analyzed for the same suite of inorganic constituents slated for samples taken from the affected areas.

4.2.1.1 North Units

The drainage basin area was investigated using an EM38 survey in conjunction with soil sampling to define the level and extent of leached salt in the soil. The area of investigation also encompassed the previously state-owned land to the north of the EPNG facility property line, as well as soils on EPNG property (Figure 6). Selection of sampling locations was based on visual evidence of salts present at the surface in conjunction with specific EM readings. Collection of soil samples was accomplished using a shovel and soil auger.

The remaining sampling of the wastewater impoundment bottoms and the bottom of the north flare pit included collecting samples from the sludge layer (if present) and the first foot of soil underlying the sludge, using a shovel and auger. Visual observations concerning the presence of organic constituents below the first foot of soil determined if deeper samples were warranted. Wastewater impoundments 2 and 3 were divided into quadrants (Figure 7) and three sample locations were selected from each quadrant for a total of 12 individual samples. Both sludge and soil samples were collected at these locations. The individual sludge samples were composited to form a single sample, as were the individual soil samples. The composite sludge sample and the composite soil sample(s) for each impoundment were then submitted for analysis (Figure 8). Selection of the sample locations within the quadrants of the wastewater impoundments was done on a site-specific basis.

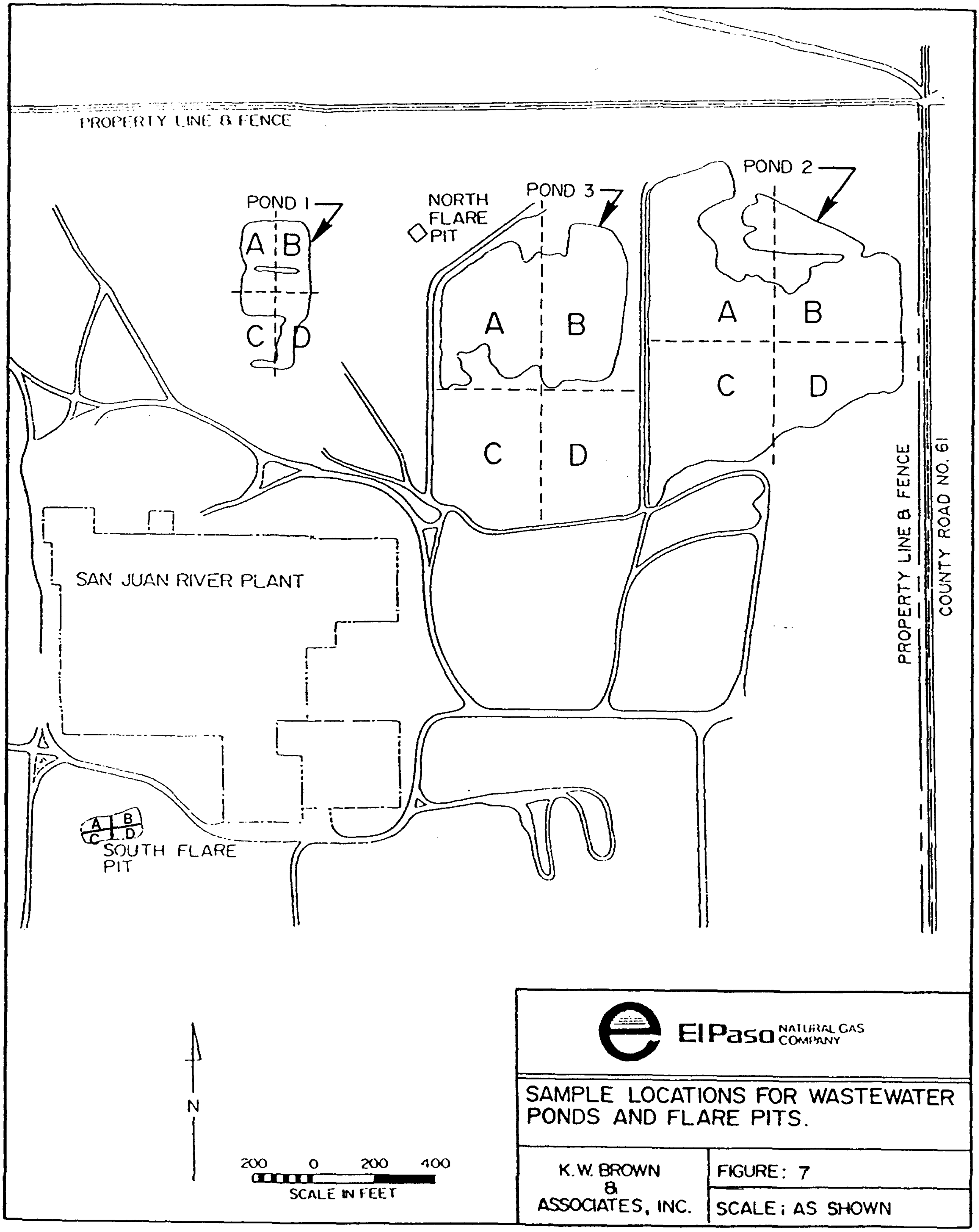
Because of the smaller size of wastewater impoundment 1, only four individual samples were collected; one from each quadrant. As with the other wastewater impoundments, the individual cores were composited to form a single sample for laboratory analysis.



El Paso NATURAL GAS COMPANY

SALT-AFFECTED SOILS
SAN JUAN RIVER PLANT

K.W. BROWN & ASSOCIATES, INC.	FIGURE: 6
	SCALE: 1" = 200'



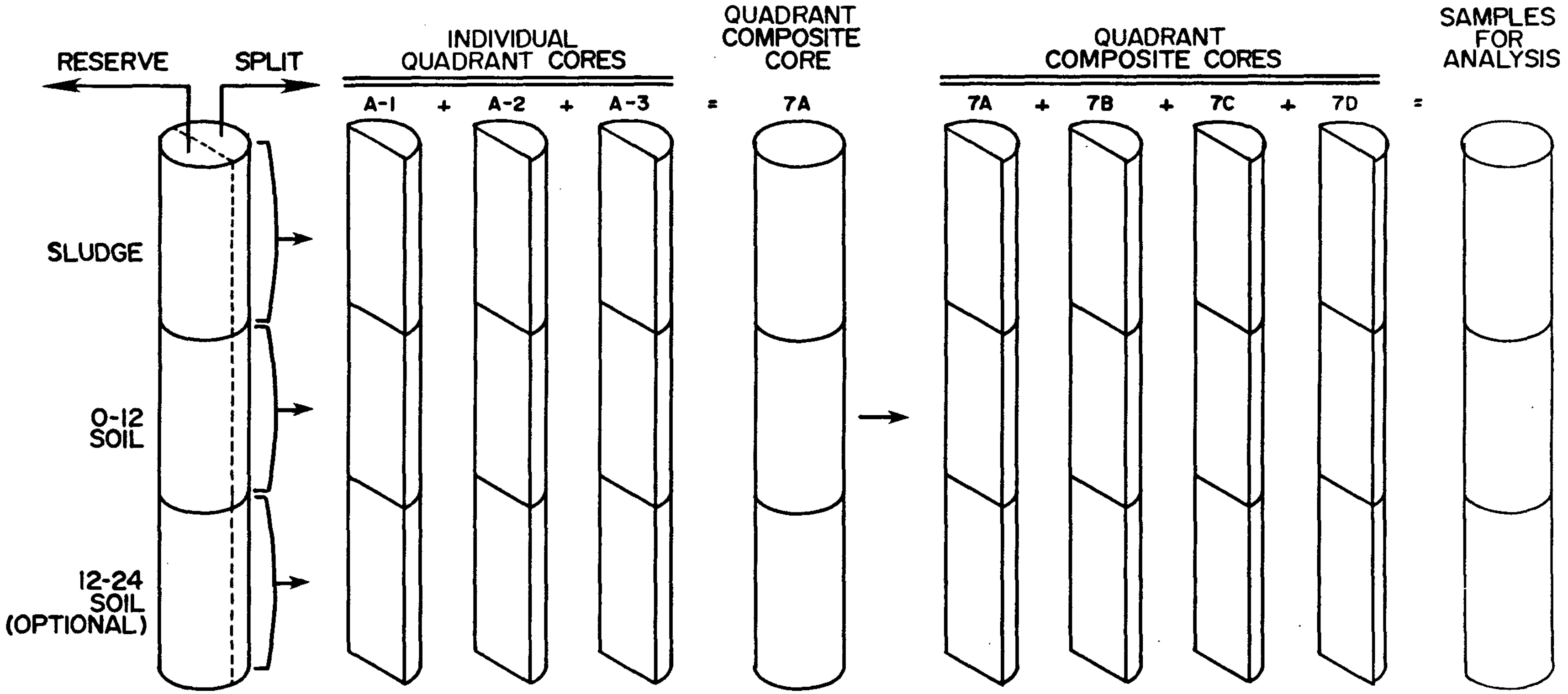
El Paso NATURAL GAS COMPANY

SAMPLE LOCATIONS FOR WASTEWATER PONDS AND FLARE PITS.

K.W. BROWN & ASSOCIATES, INC.

FIGURE: 7

SCALE: AS SHOWN



El Paso NATURAL GAS COMPANY

SAMPLE COMPOSITING SCHEME.

K. W. BROWN
&
ASSOCIATES, INC.

FIGURE: 8

SCALE: NONE

Collection of samples from the north flare pit was limited to the first foot of soil within the pit and the underlying sludge layer. The north flare pit was also sampled on January 18, 1991, by EPNG. Sample locations were selected on a site-specific basis. Because of the small size of the north flare pit, only two samples of each media were collected to form single composite samples. Samples were collected using a hand auger and shovel.

4.2.1.2 South Flare Pit

The south flare pit has been inactivated by EPNG and all of the free liquids have been removed. Samples of the sludge and underlying soils were collected on January 18, 1991. Sample location selection was made on a site-specific basis. The south flare pit was divided into quadrants and a single core was collected from each quadrant. A single composite core was generated from the four individual cores (refer to Figures 7 and 8). Visual descriptions were recorded in a field log.

4.2.2 Analytical Parameters

Soil and sludge samples were analyzed for a subset of the parameters listed in the Water Quality Control Commission (WQCC) regulations, Section 3-103. Both organic and inorganic constituents were examined. Justification for selecting a subset is based on wastewater analysis that indicates that certain chemical species listed in the regulations are not present in the wastewater. Also, some of the species listed are known to be absent in the wastes generated at natural gas processing plants. Table 3 lists the constituents that will be monitored during closure activities. Background samples collected were subjected to the same analysis suggested for samples collected in the affected areas, with the exception of the organic parameters. Because the anthropogenic organic constituents listed in the WQCC regulations should not occur in native soils, they will not be analyzed for in the background samples.

Groundwater samples will be collected at the site and analyzed for the suite of parameters listed in Table 3. Selection of these parameters is based on the WQCC regulations and the relative mobility of the constituent.

4.2.3 Sample Quality Assurance/Quality Control

In order to assure the quality of the soil and sludge samples collected, quality assurance/ quality control (QA/QC) procedures were followed both in the field and by the subcontracted laboratory. Duplicate samples were submitted for blind analysis as a QC measure for 10 percent of the samples collected. Thus, 1 of every 10 samples was duplicated. Field blanks were submitted to gauge lab performance. Briefly, field analytical QA/QC procedures included

Table 3. Analytical parameters for soil, sludge, and groundwater samples.

Soil and Sludge Samples

EC
pH
Arsenic*
Barium*
Cadmium*
Chromium*
Chloride
Cyanide
Fluoride
Lead*
Magnesium*
Mercury*
Nitrate
Potassium
Sodium
Selenium*
Silver*
Sulfate
Zinc
Benzene
Toluene
Xylenes
Oil & Grease

Groundwater Samples

EC
pH
Nitrate
Sulfate
Chloride
Magnesium
Potassium
Sodium
Benzene
Toluene
Xylene
Ethylbenzene

* TCLP or EP Toxicity analysis.

equipment decontamination with distilled-water rinse for EC and pH measurements, followed by instrument calibration using known standards. QA/QC procedures for cleaning sampling equipment used to collect soil and sludge samples for organic laboratory analysis were as follows:

- removing all excess soils from the tools
- rinsing with tap water
- rinsing with analytical-grade hexane
- rinsing with analytical-grade acetone
- rinsing with deionized water.

Dedicated bailers will be used to collect groundwater samples. All equipment used to collect groundwater samples, other than the bailers, will be subjected to the same described decontamination rinsing procedures, as appropriate.

In addition to observing field QA/QC procedures, laboratory QA/QC was required. Information concerning laboratory procedures was provided by the contract laboratory for inclusion with laboratory results. The laboratory was required to conduct matrix spikes and analyze duplicate samples. Recovery rates reported for the QA/QC samples will be required to meet the standards specified by the EPA for the given procedure.

Shipment of all samples collected at the site for offsite analyses were tracked using chain-of-custody procedures. Organic samples were preserved at 4°C and shipped to the analyzing laboratory via an overnight carrier.

4.3 DRAINAGE BASIN REMEDIATION AND CLOSURE

Previous investigations have indicated that the drainage basin downgradient from the wastewater impoundments is heavily impacted by salts (KWB&A, 1989). The extent of the salt-affected area can be visually distinguished by the presence of amorphous salts at the soil surface. The magnitude of the salt-affected area has been established through the EM38 survey to delineate the boundaries for varying levels of impacted soil.

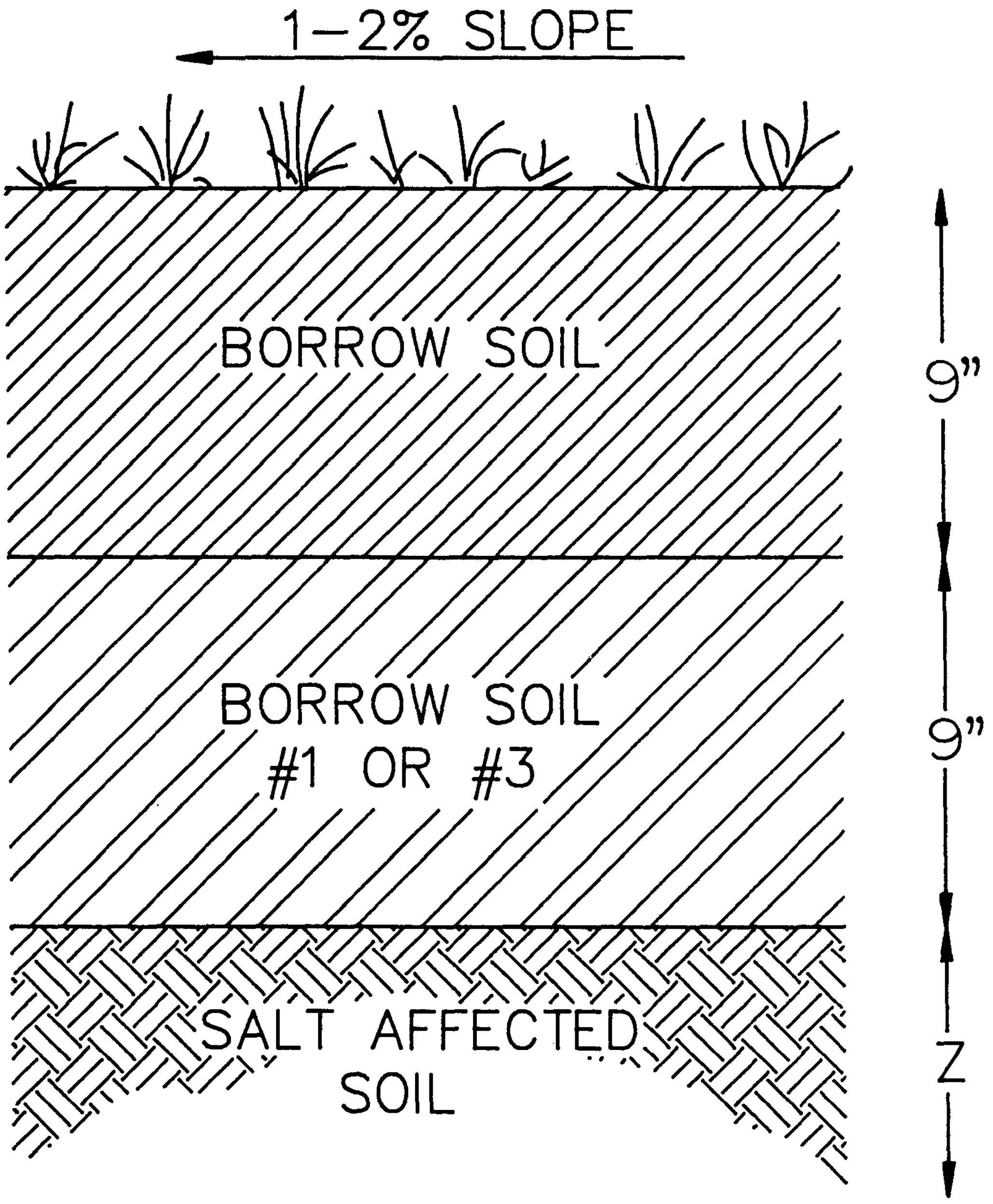
The need for excavating the soil is tied to concerns about the potential for future migration resulting from extreme precipitation events that could result in the entrainment of salt and the surface transport of these salts in the form of runoff from the site to the San Juan River. Review of the environmental setting indicates that if the salt were left in place it would, in time, be leached into the soil profile to form an innocuous saline horizon. However, the time required to accomplish this would be considerable. Therefore, it is perceived that some type of remediation that would hasten this natural phenomenon would be desirable.

In order to achieve such desirable soil horizonation, while lessening the potential that salts will migrate to vulnerable surface water bodies, it is proposed that the most impacted surface soils in the drainage basin be removed to a depth of 6 in. As the soils are excavated, they can be transported to one of the wastewater impoundments for disposal. Once excavation is completed, the excavation area would be covered with two 9-in. layers of borrow soil to simulate a saline subsoil horizon and to provide a suitable environment for the establishment of a vegetative cover (Figure 9).

4.4 WASTEWATER IMPOUNDMENTS CLOSURE

Closure activities will focus on filling the wastewater impoundments with the salt-affected surface soils excavated from the area between the wastewater impoundments and the pump-back impoundment. Initially, the cut volume of the impoundments will be calculated to determine the amount of soil needed to fill the impoundments and construct the cover system. When the impoundments have been filled and the area of affected saline soil effectively closed, the impoundments will be capped with a cover system using soil excavated from a separate borrow site. The soil cover will be 18 in. thick to prevent capillary rise of the buried salts and to restrict infiltration of precipitation. The final step will entail contouring the cover system, as well as the area downgradient of the impoundments, to control ponding, runoff, and erosion. Also included in the final step will be the establishment of a vegetative cover to control wind erosion. Discussion on the proposed cover system is presented in Section 6.0.

In addition to closing the wastewater impoundments and the north flare pit, the pump-back impoundment will have to be closed. The pump-back impoundment will be maintained as an "active" unit during the closure process to intercept any latent seepage or runoff from the impoundments that are scheduled to be closed. Ultimately, the pump-back impoundment will be closed as a landfill, and a cover system consistent with the type used for the wastewater impoundments will be used. The raw water impoundment will also be closed during site closure



El Paso
Natural Gas Company

SOIL COVER DESIGN.

PROJECT: 637089001 (EPNG–SCD)			LOCATION: SAN JUAN RIVER PLANT		
K.W. BROWN & ASSOCIATES, INC.					DATE: 10–23–90
APPR:			DRAWN BY:	SCC	SCALE: NONE
DATE:			DATE:	12–12–89	FIGURE: 9

activities. Sampling of the raw water pond will not be required because it never received wastewater. This pond will be filled with the dike material and the most convenient borrow material and contoured.

4.5 FLARE PIT CLOSURE

Closure of the north flare pit will be incorporated into the closure activities of the wastewater impoundments. That is, the contaminated area of the flare pit will be excavated and an 18-in. soil cover will be placed over it. Depth of excavation will depend on the depth to which contamination has been determined.

It may be likely that some of the material present in the flare pits will have to be treated and may need to be removed. If it is necessary to remove sludges and contaminated soil due to high organic constituents content, it is proposed that a small land treatment cell be constructed to degrade the organic constituents using conventional land treatment technology. Following treatment, it is proposed that the treated soils/sludges then be replaced in the flare pit for closure. In the event site assessment activities indicate that the sludges and contaminated soil can be managed inplace, the bottom of the pit will be managed much like a land treatment unit to degrade the organic constituents present. Regardless of where the waste material is treated, samples will be collected for hydrocarbon constituents to verify degradation prior to final closure activities.

4.6 OPTIONAL REMEDIATION EFFORTS

Dependent upon the data acquired during the site assessment phase of the closure process, wastewater impoundment bottoms may be excavated to make room for the disposal of excavated soils containing higher salt levels. The objective of this measure is to ensure that soils containing the highest levels of salts are as far from the surface as possible.

Another remediation option is the application of a thin layer of gypsum to the subsoil soil surface before the cover system is placed on top. This may prove useful in localized areas of excessively high salt concentrations. In addition to creating a capillary barrier for the upward migration of salts, the gypsum will also help stabilize salts that would otherwise move toward the surface.

5.0 COVER SYSTEM DESIGN

Based on information gathered during the land application feasibility study, observations from the bench-scale study concerning capillary rise, and field observations, it has been determined that a soil cover system will be acceptable, provided that a shallow water table does not persist. (Determining the presence of a water table will rely on measurement from the piezometers installed in the drainage basin.) The soil cover system is intended for use in the drainage area where soils will be excavated as well as over the recontoured wastewater impoundments.

Justification for using a soil cover, which consists of 18 in. of borrow soil, is related to the amount of precipitation received and the type of soil at the site. These two site characteristics, as documented by the SCS and previous field observations, have resulted in the formation of natural saline horizons in the soil profile. Using an 18-in. soil cover will, in essence, result in the formation of a subsurface saline horizon.

The effectiveness of the soil cover can be enhanced by using two separate borrow soils. Borrow soils #1 or #3 are coarser textured than borrow soil #2; therefore, a minor textural discontinuity can be created. Using either borrow #1 or #3 to construct the lower portion of the soil cover will encourage moisture to be retained by the finer-textured borrow soil #2 in place as a top dressing (Figure 9). The effects of a shallow water table cannot be discounted because it is this feature that has resulted in the precipitation of salt in the drainage. Therefore, in order for the proposed 18-in. soil cover to be effective, it is imperative that the water table be lowered. Observations during the field investigation indicate that soils in the drainage are drying, and the depth to groundwater is increasing in response to removing the hydraulic head from the wastewater impoundments. It will be necessary to verify this trend by routine monitoring.

Based on this assessment, a gravel capillary barrier is not necessary. Consideration for using textural discontinuity in the cover system may be warranted based on the final cut and fill calculations and the observed depth to water.

The stability of the soil cover system will be insured by the establishment of a vegetative cover. A mixture of annual and perennial grasses will be planted on the cover system to accomplish soil stability. Attempts will be made to keep vegetative ground cover of the soil cover system at approximately 90 percent of the vegetative ground cover found in similar background locations.

6.0 POST-CLOSURE

Once all closure activities are completed and the cover systems are in place, the post-closure care period will begin. Activities associated with this phase will include measuring water levels in the piezometers and establishing and caring for the cover systems. A notice will be attached to the property deed which details the location and nature of the closed units.

6.1 GROUNDWATER MONITORING

The groundwater in the area will continue to be monitored on a semiannual basis to determine that the depth to water remains at or below 15 feet to prevent the upward migration of salts. Following the closure activities, it is expected that the depth to groundwater will gradually increase as a result of the removal of the hydraulic head created by the impoundments. Collection of groundwater is not suggested for the post-closure care period.

6.2 COVER SYSTEM MONITORING

The cover system would be monitored visually on an annual basis for approximately 5 years to ensure that adequate ground cover by vegetation exists and that salts are not accumulating on the soil surface.

Potential cover system problems that should be monitored are the development of erosion channels, subsidence, and degradation to the cover system by prairie dogs. If these or any other circumstances arise, they will require alternative steps to ensure the preservation of the cover system. After the cover system has been stabilized, it can be decided at what time interval it will be checked or if monitoring can be discontinued.

7.0 SUMMARY AND RECOMMENDATIONS

This report defines the final methods and procedures that were selected for the closure of the EPNG SJRP wastewater impoundments and flare pits. The primary objective of this closure effort is to isolate the salt-contaminated soil in such a manner that the salts are no longer mobile in the environment. To accomplish this goal, excavation, burial, and a soil cover system are proposed. These closure protocols are based on the field data gathered during previous studies, an EM38 geophysical study, and a bench-scale capillary rise study.

Excavation of the drainage basin area will involve the removal of highly impacted surface soils exhibiting amorphous salt deposits and degraded soil structure. Visual observations, sample data, and the EM38 survey define these areas as having excessively high salt concentrations. Additional excavation and recontouring will also be required to insure proper slope and drainage patterns are maintained. Information presented in this report supports removal of the top 6 in. of affected soil from the drainage basin area. Removal of soil to this depth will insure that the most highly impacted soil is removed and transported to the wastewater impoundments for burial. Following excavation, a soil cover system will be put inplace using two 9-in. lifts of native borrow soil. This 18-in. soil cover system will aid in the isolation of the salt-contaminated soil and will provide adequate rooting depth for the establishment of vegetation.

Results from the bench-scale study indicate that capillary rise through a soil cover constructed from potential borrow sites is possible. The conditions that might cause capillary rise would be saturated conditions near the soil surface (i.e., shallow water table). However, it appears that the shallow water table that has persisted at the site is the direct result of water leaching from the wastewater impoundments. Therefore, as the hydraulic head is removed from the impoundments, it is expected that the water table will drop to acceptable levels. Observations from the site indicate that the water table is responding favorably (e.g., increasing depth from the soil surface) to the reduced hydraulic head. In the event that the water table does not fully dissipate, additional options (e.g., drainage system) will be considered.

It is reasonable to assume that continued operation of the raw water impoundment would support an elevated water table in some portion of the drainage. Therefore, in order to consider using a soil cover system, the raw water impoundment will be removed from service.

Use of an 18-in. soil cover over the excavated drainage area and the wastewater impoundments represents a cost-effective, environmentally acceptable goal. Evidence presented in this report indicates that environmental conditions are favorable for isolating the salts using this approach. Based on closure cost estimates it may be desirable to consider constructing a textural discontinuity subsoil horizon by using two different borrow soils available at the site. However, the use of a gravel capillary barrier is not deemed necessary.

Conclusions offered in this report can be summarized as follows:

1. The salt-affected area has been identified and the lateral extent quantified.
2. The salt-affected soil extends to a depth of greater than 4 ft, which makes excavation impractical.
3. Excavation of salt-affected soil can be limited to the upper 6 in. of the drainage basin area with highly impacted surface soils and should be followed by placement of a soil cover system.
4. Closure of the wastewater impoundments can be limited to placing the salt-affected soils excavated from the drainage into the pond, recontouring, and installing a soil cover system.
5. Construction of the cover system can be limited to an 18-in. layer of borrow soil; the thickness may be increased based on cut and fill calculations.
6. The effectiveness of the cover can be enhanced by employing two borrow soils; the coarser soil forms a capillary barrier and the finer textured soil is a moisture-retention zone.
7. An optional layer of gypsum may also be incorporated locally to aid in providing a capillary barrier and help stabilize elevated levels of salts.
8. The presence (or lack) of a shallow water table must be documented prior to initiating closure activities.

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APPENDIX A

Stormwater Runoff Study

STORMWATER RUNOFF STUDY

HYDROLOGIC SETTING --

Stevens Arroyo is located in the northwest sector of San Juan County, New Mexico, which is characterized by a high plateau dissected by the San Juan River. Runoff conveyed by the intermittent streams in Stevens Arroyo ultimately empties into the San Juan River (i.e., Stevens Arroyo is located within the San Juan River drainage basin). Distant high mountains form an orographic barrier to the plateau and river valley, effectively shielding the area from storms capable of delivering high volumes of precipitation to the basin. Summer showers are less frequent and intense than those occurring in most of northwestern New Mexico. The majority of the annual precipitation received by the county occurs during the winter months (SCS, 1980).

The principal soil unit occurring in Stevens Arroyo is the Badland-Monierco-Rock outcrop complex. This map unit is characterized by 40 percent Badland soils, 30 percent Monierco soils, and 20 percent Rock outcrop. Badland soils consist of barren shale uplands dissected by deep drainageways, accommodating intermittent streams. Soils of the Monierco series were formed in alluvial and eolian material derived mainly from shale. Rock outcrop consists of barren sandstone occurring as ridges, benches, and escarpments. Textures assigned to these soils by the United States Department of Agriculture (USDA) include fine sandy loam, sandy clay loam, clay loam, and loam. Permeability of the unit is estimated to range from 0.2–6.0 in./hr. (SCS, 1980).

AVAILABLE DATA --

Information used as input to the watershed model was derived from U.S. Geological Survey (USGS) topographic and geologic maps, SCS soil survey of San Juan County, and U.S. Weather Bureau Technical Paper 40 (TP-40) (U.S. Weather Bureau, 1963). These sources provided information on drainage basin morphology, soil character, and statistical climatic events of the region. The available data were adequate to justify performing the watershed study.

DESCRIPTION OF THE MODEL --

The watershed model chosen for use in this exercise was the U.S. Army Corps of Engineer HEC-1 Flood Hydrograph Package developed at the Hydrologic Engineering Center (HEC) in Davis, California. The computer program—written in FORTRAN—is implemented on an IBM

PC-compatible computer system at K. W. Brown & Associates, Inc. (KWB&A). The version of the model used in the study is dated January 1985.

To avoid misstatement of the principal function of the computer model, note that "the HEC-1 model is designed to simulate the surface runoff response of a river basin to precipitation by representing the basin as an interconnected system of hydrologic and hydraulic components" (HEC, 1981).

As with any type of mathematical modeling exercise, there are a number of assumptions accompanying the HEC-1 computer program. The most salient assumptions employed by the model include (HEC, 1981):

- Hydrologic processes can be represented by model parameters that reflect average conditions within a sub-basin.
- Model parameters represent temporal as well as spatial averages.
- There are no provisions within the model for soil moisture recovery during periods of zero precipitation.
- Stream flow routing is approximated by hydrologic methods and does not consider hydraulic effects described by the St. Venant equations.

Similar to the majority of currently available engineering simulation software, HEC-1 is designed to operate in "batch" mode. Unlike interactive programs, a "batch" program conducts a single simulation by accepting input, performing computations, and generating output. HEC-1 requires a number of input data describing the following:

- stream network geometry;
- sub-basin characteristics (e.g., area);
- the precipitation event to be applied to the river basin;
- interception/infiltration losses;
- type of unit hydrograph to be utilized; and
- type of stream flow routing to be employed.

The principal output generated by the HEC-1 model consists of values of volumetric flow rate versus time, or stream flow hydrographs, at selected locations in the river basin (HEC, 1981). Conversion of this output to water levels in the river requires a stage (elevation) versus discharge (volumetric flow rate) curve. A companion program developed by HEC, called HEC-2 Water Surface Profiles, can be used conjunctively with HEC-1 to generate "water surface profiles for steady gradually-varied flow in natural or man-made channels" (HEC, 1982). Usage of HEC-2 requires accurate knowledge of channel geometry, however.

APPLICATION OF MODEL TO STEVENS ARROYO --

The first step in development of the input file for the model involved delineation of the watershed and subdivision of the watershed into sub-basins. A sub-basin is a component of a watershed possessing approximately uniform hydrologic properties throughout its extent. Figure A-1 is a map of the watershed accommodating Stevens Arroyo and its associated tributaries. The watershed was subdivided into eight sub-basins, each with similar hydrologic characteristics (Table A-1).

Table A-1. Sub-basin characteristics of the Stevens Arroyo Watershed.

Sub-basin	Area[a] (sq mi)	Length to Divide[b] (ft)	Average Watershed Slope[b] (%)	SCS Curve Number[c]	SCS Time Lag[d] (hrs)
10	1.1131	9,200	4.00	70	1.25
20	0.9899	11,900	6.67	70	1.19
30	1.2449	14,400	2.50	70	2.27
40	0.2797	5,400	9.23	70	0.54
50	0.2667	8,400	10.53	70	0.72
60	0.2754	7,000	3.85	70	1.03
70	0.8725	12,900	4.44	70	1.56
80	0.3493	9,000	4.71	70	1.13

[a] Planimetered from 1:24,000 map of watershed.

[b] Measured from 1:24,000 USGS quadrangle.

[c] Estimated using SCS soil survey and SCS curve number tables for the following conditions (SCS, 1980; McCuen, 1982):
antecedent soil moisture condition II
hydrologic soil group "C"
pasture or range in good condition.

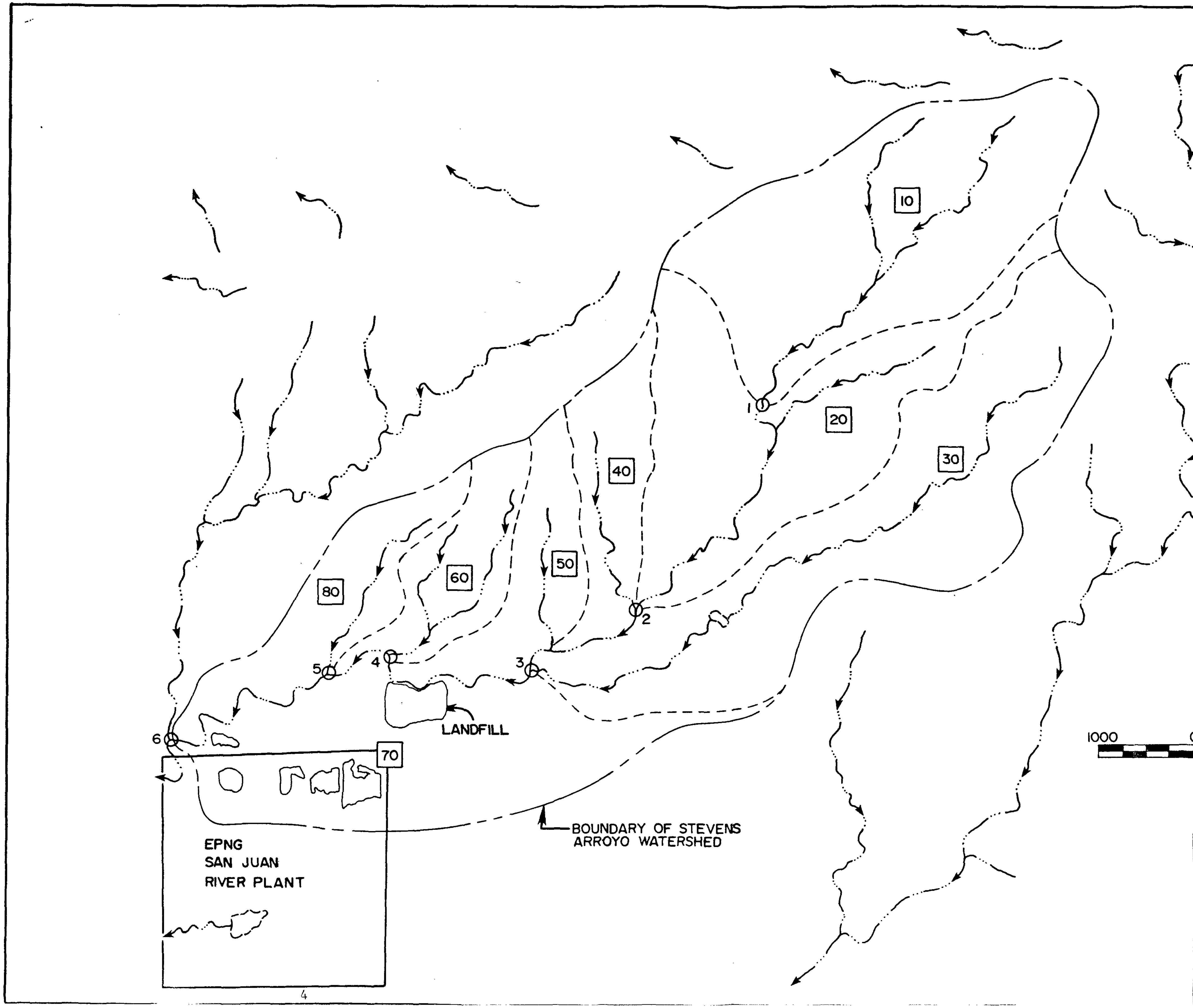
[d] Computed using the following equation (Viessman et al., 1977):

$$t_l = \frac{l^{0.8}(S+1)^{0.7}}{1900Y^{0.5}}$$

where:

t_l = lag time (hours)
l = length to divide (ft)
S = (1000/CN)-10 (dimensionless)
CN = SCS curve number (dimensionless)
Y = average watershed slope (percent).

The HEC-1 is designed to simulate the response of a watershed to a precipitation event. Accordingly, statistical data were compiled describing historical climatic events occurring in Stevens Arroyo. TP-40 (U.S. Weather Bureau, 1963) is an invaluable source of statistical climatic data for hydrologists because the data are presented in a manner amenable to rapid access and cover a wide range of recurrence intervals (from 1-100 years). Table A-2 lists storm duration and precipitation depth for selected values of recurrence interval for the Stevens



El Paso NATURAL GAS COMPANY

MAP OF STEVENS ARROYO WATERSHED
SHOWING SUB-BASIN DELINEATIONS

K. W. BROWN & ASSOCIATES, INC.	FIGURE: A-1 SCALE: AS SHOWN

Table A-2. Statistical, climatic data for Farmington, NM.[a]

Recurrence Interval (yrs)	Storm Duration (hrs)	Precipitation Depth (in)	Recurrence Interval (yrs)	Storm Duration (hrs)	Precipitation Depth (in)
1	0.5	0.36	25	0.5	1.15
	1	0.50		1	1.45
	2	0.60		2	1.75
	3	0.72		3	1.85
	6	0.82		6	2.40
	12	1.00	12	3.00	
	24	1.25	24	3.00	
2	0.5	0.50	50	0.5	1.34
	1	0.62		1	1.70
	2	0.80		2	2.00
	3	0.80		3	2.20
	6	1.20		6	2.45
	12	1.50	12	3.30	
	24	1.50	24	3.50	
5	0.5	0.75	100	0.5	1.50
	1	0.96	1	1.90	
	2	1.18		2	2.25
	3	1.25		3	2.50
	6	1.50		6	3.00
	12	2.00	12	3.50	
	24	2.10	24	4.00	
10	0.5	0.95			
	1	1.20			
	2	1.40			
	3	1.70			
	6	2.00			
	12	2.50			
	24	2.50			

[a] Source: U.S. Weather Bureau, 1963.

Arroyo area, taken from TP-40 (Note: these data were interpolated from contour maps and, as such, represent mild approximations because each interpreter may choose slightly different values). Figure A-2 is a graphical display of these data.

Reflection on the purpose of the watershed model was used to arrive at appropriate values of recurrence interval and storm duration. Because closure activities at Stevens Arroyo may impact the surface drainage system, it seemed prudent to choose a fairly significant climatic event for simulation with HEC-1. Correspondingly, a recurrence interval of 25 years and a

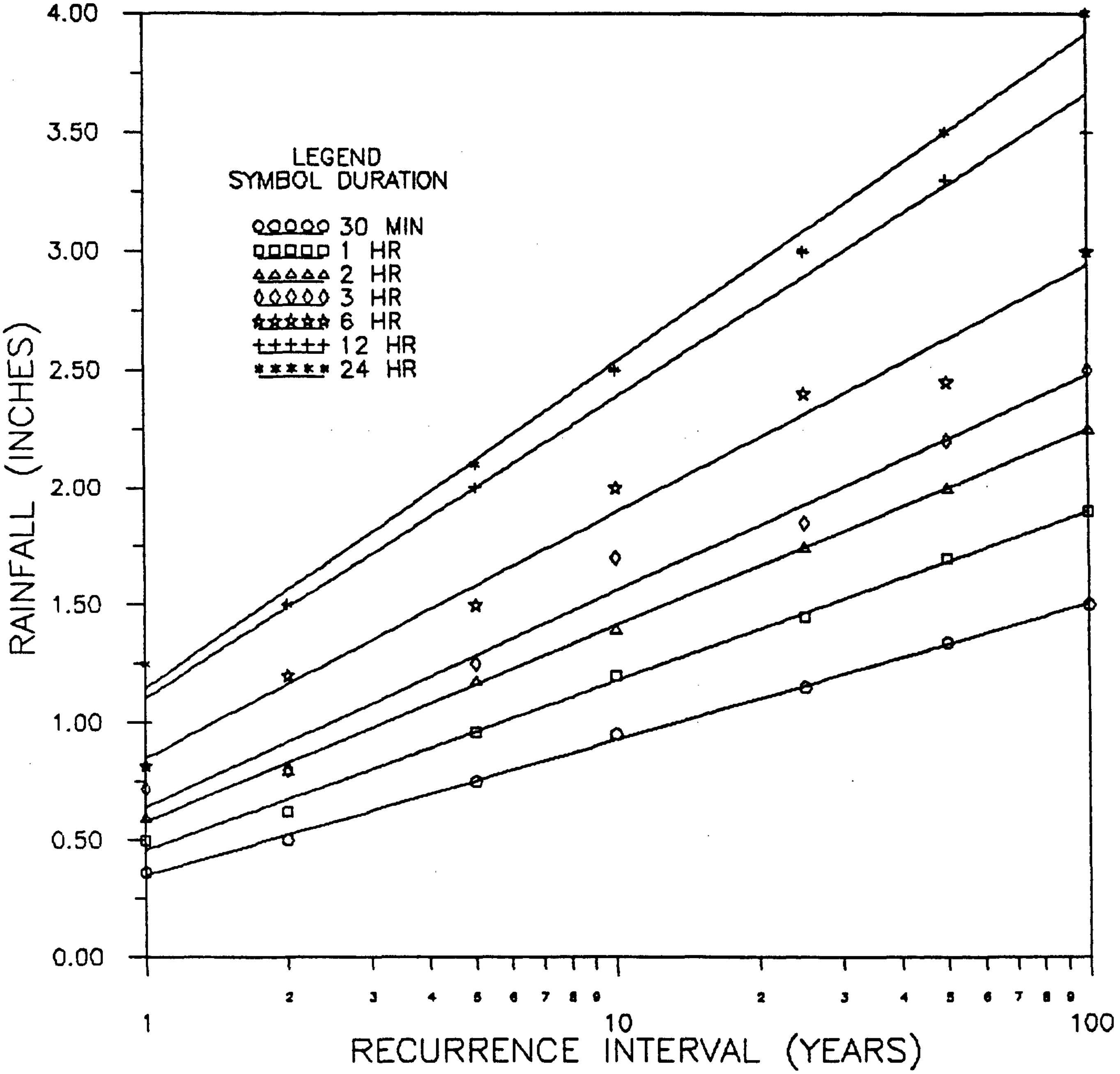


Figure A-2. Graph of recurrence interval versus rainfall depth for selected storm durations for Farmington, NM (Source: TP-40).

storm duration of 24 hours were used to determine a total precipitation depth of 3.00 in. of rainfall (Table A-2).

Not only is total precipitation depth important to a simulation effort, but the temporal distribution of the rainfall plays an equally important role. For example, a slow, steady rain may not develop any appreciable runoff. Conversely, a storm similar to a thunderstorm, where the majority of the rainfall is received in a matter of minutes, may result in a substantial volume of precipitation excess, or runoff. Studies of historical records of rainfall distribution in the United States by the SCS indicate two major regions with similar rainfall patterns; these regions have been assigned rainfall distributions of Type I and Type II. Type I distributions apply to Hawaii, Alaska, and the coastal side of the Sierra Nevada and Cascade Mountain ranges in California, Oregon, and Washington. The balance of the United States, including Puerto Rico and the Virgin Islands, possess Type II storm patterns (McCuen, 1982). Thus, the 3.00-in. total precipitation depth for Stevens Arroyo was distributed using the SCS Type II rainfall distribution. Figures A-3 and A-4 graphically depict the rainfall distribution used in the HEC-1 model. Figure A-3 is the incremental precipitation pattern for the storm of 24-hour duration. Note that rainfall intensity rapidly peaks at the 12-hour point on the graph. Figure A-4 is a "mass curve" of Figure A-3, which is a plot of cumulative precipitation versus time.

HEC-1 uses the unit hydrograph (UH) method of computing runoff hydrographs at selected points in a drainage basin (HEC, 1981). A UH, developed through an analysis of rainfall/runoff records of a given watershed/sub-basin, may be directly input to HEC-1, or a synthetic UH may be computed by HEC-1 using user-supplied parameters (HEC, 1981). There are a number of synthetic UHs available. The version of HEC-1 used in the present study allows for the use of the Clark UH, the Snyder UH, and the SCS Dimensionless UH. The Clark UH requires that three parameters, specific to a given watershed/sub-basin, be input to generate the UH. The Snyder UH requires that two parameters be specified by the user; however, HEC-1 uses the Clark method to generate a Snyder UH. Finally, only one parameter—SCS lag time—is required to use the SCS Dimensionless UH. SCS lag time is defined as the time interval between the center of mass of effective precipitation and the time at which peak discharge occurs (Viessman et al., 1977). As lag time is a fairly easy parameter to calculate, the SCS UH was selected for the Stevens Arroyo watershed study. Figure A-5 is a plot of the SCS Dimensionless UH.

The last piece of information needed to complete the input data set deals with hydrograph routing parameters unique to given reaches of the main channel of Stevens Arroyo. Hydrograph routing is used to simulate the movement of a flood wave through a river reach or reservoir (HEC, 1981). As a wave moves downstream, friction between the water and the chan-

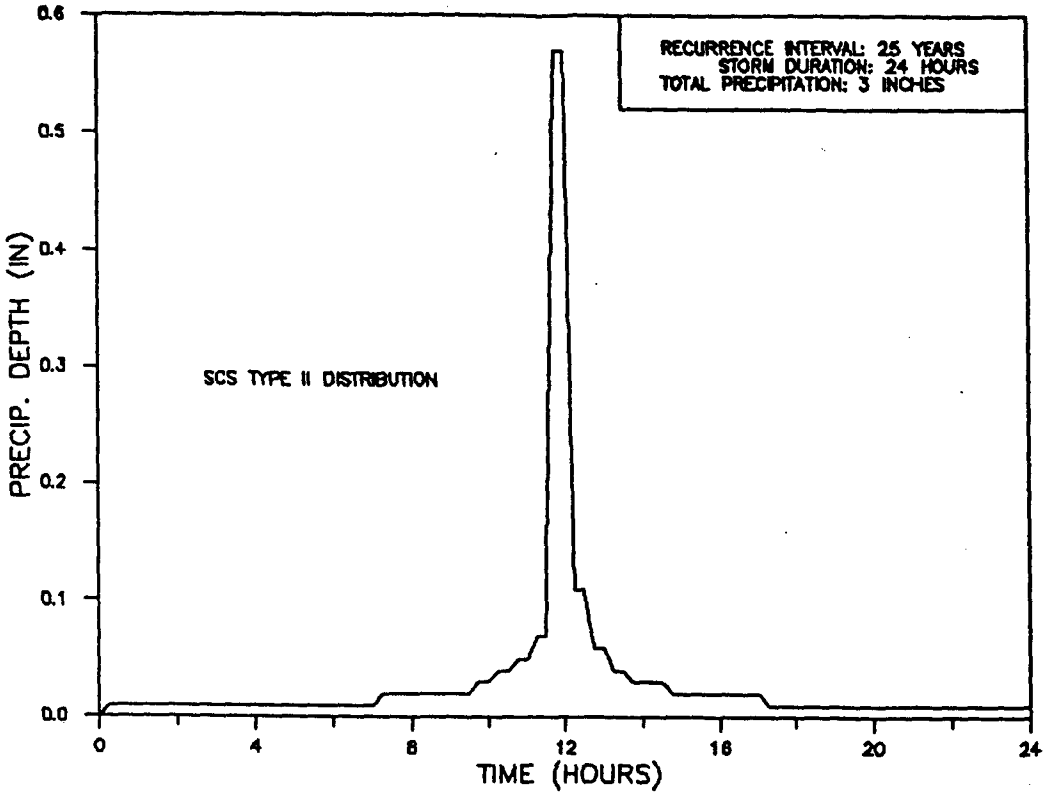


Figure A-3. Rainfall distribution of storm applied to Stevens Arroyo watershed.

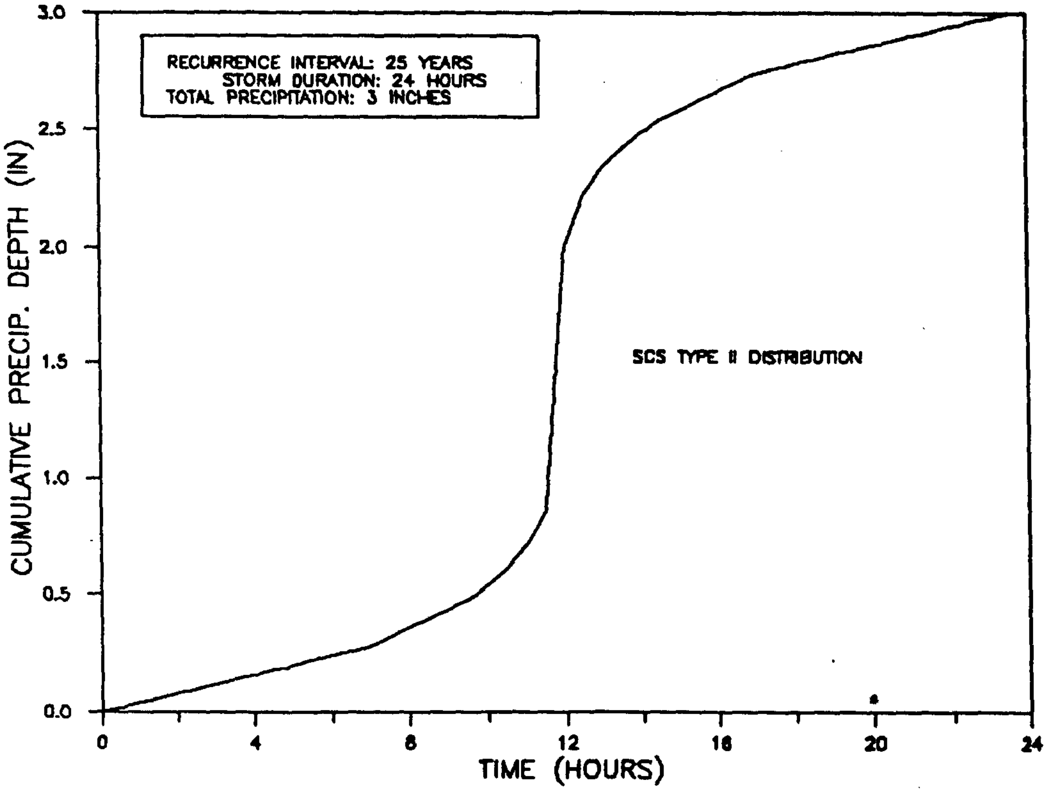


Figure A-4. Mass curve of rainfall distribution applied to Stevens Arroyo.

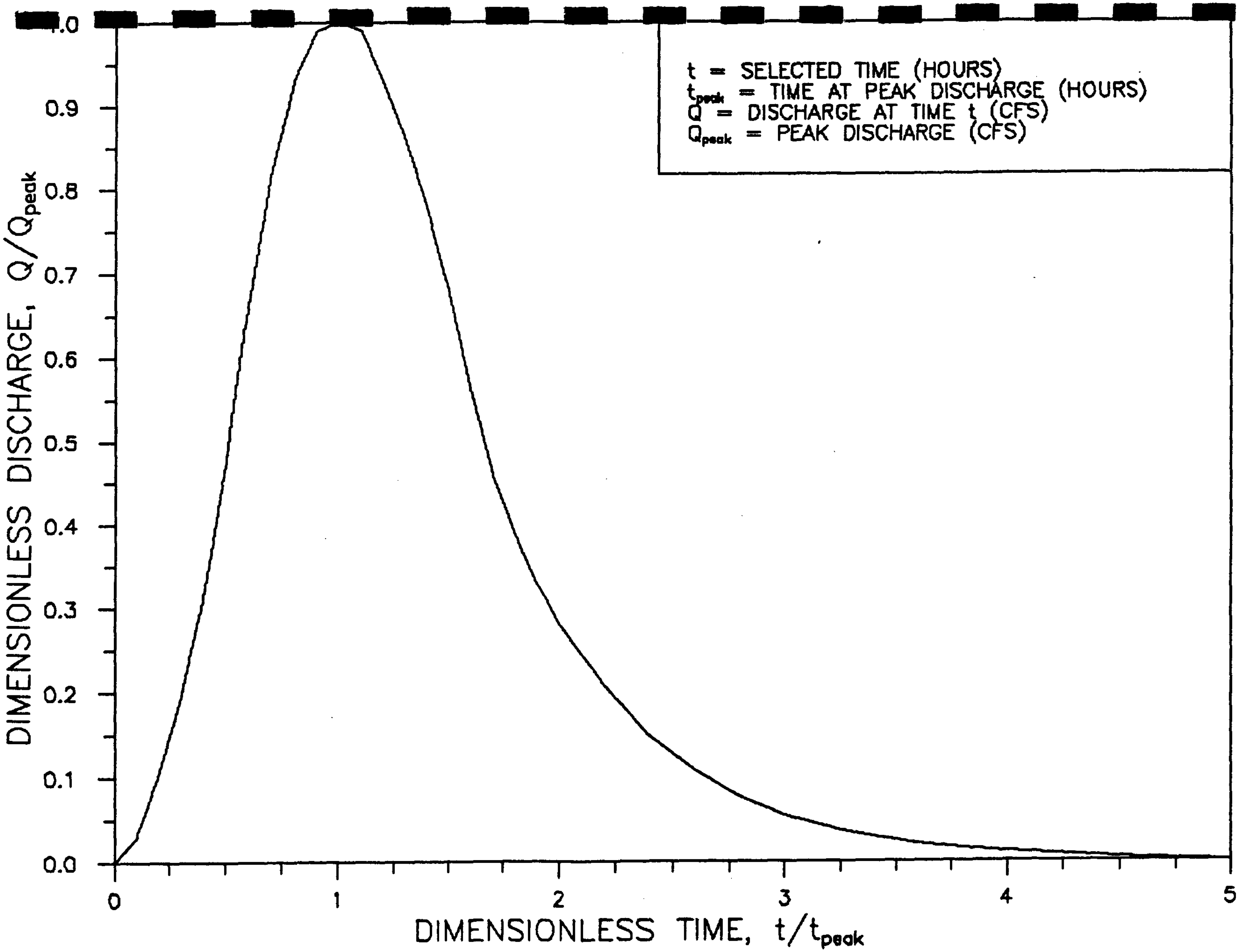


Figure A-5. Graph of SCS dimensionless unit hydrograph used in HEC-1 watershed model.

nel bottom and sides results in loss of energy. Without routing, a hydrograph moves downstream unimpeded by frictional loss, and an overestimate of peak discharge and an underestimate of time to peak discharge result.

Two types of routing are available in modeling: (1) hydrologic routing and (2) hydraulic routing. Hydrologic routing utilizes conservation of mass and some type of analytic or assumed relationship between storage and discharge within the routing reach (Viessman et al., 1977). Conversely, hydraulic routing, a much more precise representation of the dynamics of wave motion, requires the solution of a system of partial differential equations, the so-called St. Venant equations of continuity and motion (Viessman et al., 1977).

HEC-1 permits the use of hydrologic routing techniques only (HEC, 1981). Options available for river routing in HEC-1 include (1) channel infiltration, (2) Muskingum, (3) modified Puls, (4) working R & D, (5) average-lag method, and (6) kinematic wave routing (HEC, 1981). For the sake of brevity, the merits and/or disadvantages of each of the aforementioned methods will not be enumerated here.

Because of its simplicity, Muskingum channel routing was selected for the Stevens Arroyo model. Two parameters are required to utilize the Muskingum method: (1) travel time through the routing reach (the Muskingum "K") and (2) a weighting coefficient between inflow and outflow from a river reach (the Muskingum "x") (Viessman et al., 1977). The Muskingum "x" ranges from 0 to 0.5, and generally averages 0.2. A value of "x" = 0.5 results in pure translation of the hydrograph. In the absence of gauged discharge data, a value for "x" must be assumed. Because there are no data available for stream discharges, 0.2 was used for the Muskingum "x" in the Stevens Arroyo model for each routing reach. Figure A-1 identifies routing reaches as those lengths of the main channel lying between adjacent river stations. Table A-3 lists the characteristics of the routing reaches within the Stevens Arroyo watershed.

Table A-3. Hydrograph routing rata for the Muskingum method.

Routing Reach	Channel Length [a] (ft)	Estimated Stream Velocity[b] (ft/sec)	Estimated Travel Time (hrs)	Muskingum "K" (hrs)	Muskingum "x"
1-2	5,500	2.69	0.5683	0.5683	0.20
2-3	2,800	2.69	0.2893	0.2893	0.20
3-4	3,200	2.69	0.3307	0.3307	0.20
4-5	1,800	2.69	0.1860	0.1860	0.20
5-6	4,200	2.69	0.4340	0.4340	0.20

[a] Measured from 1:24,000 USGS quadrangle.

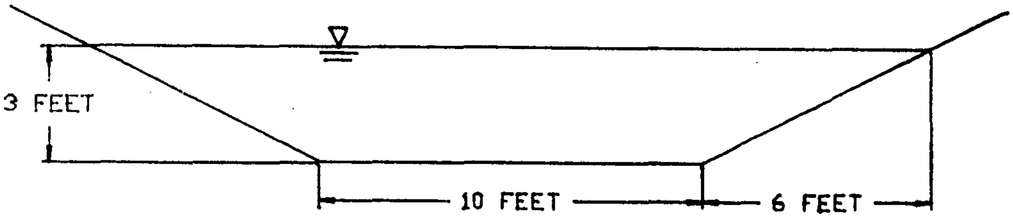
[b] Approximated via the Manning equation (Linsley and Franzini, 1979):

$$V = \frac{1.49}{n} R^{2/3} S_o^{1/2}$$

where:

V = average flow velocity in channel (ft/sec)
n = Manning's roughness coefficient (dimensionless)
R = hydraulic radius (ft) = A/P
A = cross-sectional area of flow (sq ft)
P = wetted perimeter (ft)
S_o = slope of the channel bottom (dimensionless)

The following channel geometry was assumed:



n = 0.040 (natural channel - winding w/some pools and shoals) (Vennard and Street, 1982).
S_o = 0.002 # estimated.

RESULTS AND DISCUSSION --

As mentioned previously, output produced by HEC-1 consists of hydrographs at given locations within a watershed. Figure A-6 is the generated hydrograph at the outlet to the Stevens Arroyo watershed, Station 6 (Figure A-1). Hydrographs are available at the end of this appendix for the remaining river stations. The peak discharge computed by HEC-1 for the 25-year, 24-hour storm is 410 cubic ft per second (cfs); this peak occurred 14.75 hours after the onset of precipitation.

Unless the relationship between river stage (water surface elevation) and discharge is known (i.e., a rating curve must be available), it is not possible to determine the water depths in the stream at Station 6. As an approximation, a rating curve was developed (Figure A-7) using the Manning equation and the assumptions used to define Table A-3. The stream geometry was approximated by a trapezoidal channel, 10 ft wide at the bottom, having side slopes of 2H:1V. A bed slope of 0.002 (0.2 percent) was assumed, and a Manning's "n" value of 0.040 was chosen to represent the stream channel's roughness coefficient. Manning's equation assumes uniform flow conditions in the stream channel. Entering Figure A-7 with the peak discharge value of 410 cfs yields a maximum normal depth at Station 6 of 5.4 ft. Caution should be exercised,

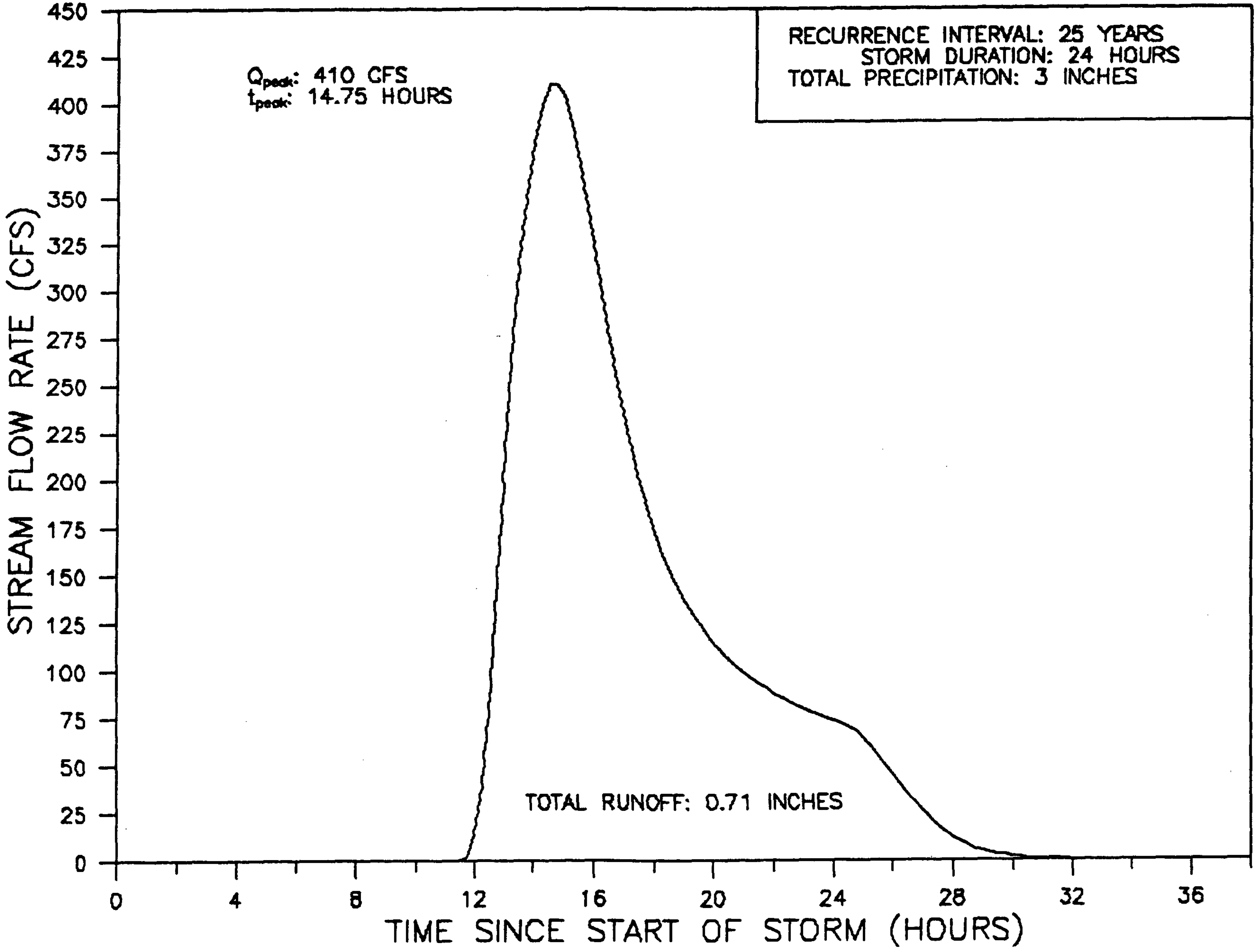


Figure A-6. Hydrograph generated by HEC-1 at the outlet to Stevens Arroyo.

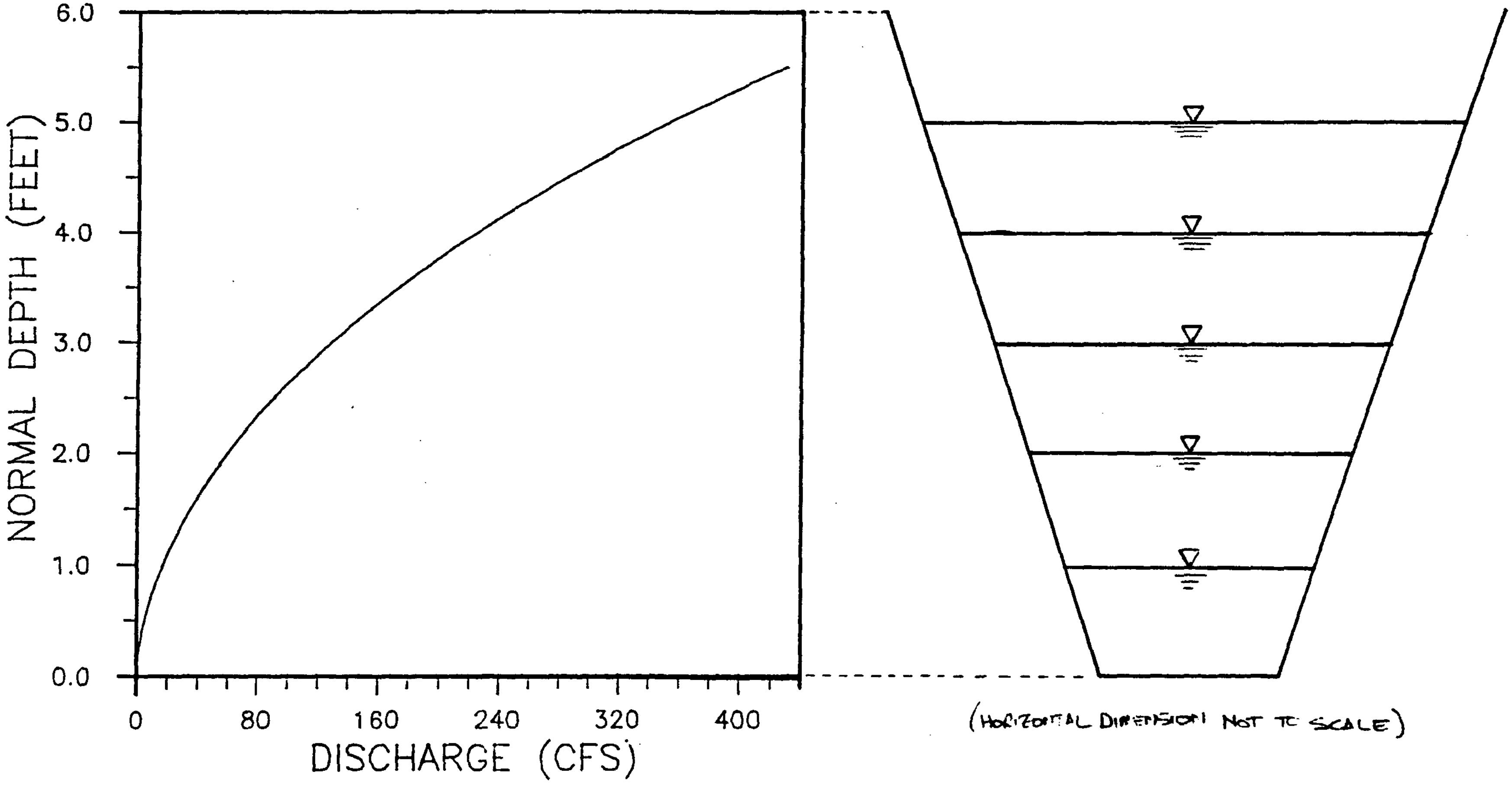


Figure A-7. Rating curve for stream channel cross-section at the outlet to Stevens Arroyo.

however, when utilizing this value to represent actual, expected field conditions. This exercise is merely offered to aid the reader in understanding the magnitude of flows depicted by the output hydrograph. To properly determine stream stage, a cross section should be constructed from field-surveyed elevations at selected points transverse to the stream flow direction.

Finally, the storm of 24-hour duration resulted in an outflow hydrograph with a time base of about 32 hours (i.e., 32 hours after the rain began to fall, there was no more flow in the stream, as the infiltration capacity exceeded the precipitation intensity). The 25-year, 24-hour storm yielded a total precipitation of 3.00 in. However, as a result of hydrologic abstractions (losses), only 0.71 in. was found to result as precipitation excess (i.e., only 23.7 percent of the total rainfall was manifested as runoff).

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HYDROGRAPH DATA

Table A-1. HEC-1 Output: Sub-basin 10 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	22	31	MAY	4	30	0
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	21	31	MAY	4	45	0
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	20	31	MAY	5	0	0
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	20	31	MAY	5	15	0
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	19	31	MAY	5	30	0
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	19	31	MAY	5	45	0
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	18	31	MAY	6	0	0
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	18	31	MAY	6	15	0
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	17	31	MAY	6	30	0
30	MAY	2	15	0	30	MAY	11	45	2	30	MAY	21	15	17	31	MAY	6	45	0
30	MAY	2	30	0	30	MAY	12	0	13	30	MAY	21	30	17	31	MAY	7	0	0
30	MAY	2	45	0	30	MAY	12	15	33	30	MAY	21	45	16	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	65	30	MAY	22	0	16	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	97	30	MAY	22	15	16	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	118	30	MAY	22	30	15	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	128	30	MAY	22	45	15	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	126	30	MAY	23	0	15	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	117	30	MAY	23	15	14	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	102	30	MAY	23	30	14	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	89	30	MAY	23	45	14	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	78	31	MAY	0	0	14	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	69	31	MAY	0	15	13	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	62	31	MAY	0	30	13	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	55	31	MAY	0	45	12	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	50	31	MAY	1	0	10	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	46	31	MAY	1	15	8	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	42	31	MAY	1	30	6	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	39	31	MAY	1	45	5	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	36	31	MAY	2	0	4	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	34	31	MAY	2	15	3	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	31	31	MAY	2	30	2	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	30	31	MAY	2	45	1	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	28	31	MAY	3	0	1	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	27	31	MAY	3	15	1	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	26	31	MAY	3	30	1	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	24	31	MAY	3	45	0	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	23	31	MAY	4	0	0					
30	MAY	9	15	0	30	MAY	18	45	22	31	MAY	4	15	0					

Table A-2. HEC-1 Output: Sub-basin 10 Hydrograph Routed to Station 2.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	24	31	MAY	4	30	0
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	23	31	MAY	4	45	0
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	22	31	MAY	5	0	0
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	21	31	MAY	5	15	0
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	21	31	MAY	5	30	0
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	20	31	MAY	5	45	0
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	19	31	MAY	6	0	0
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	19	31	MAY	6	15	0
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	18	31	MAY	6	30	0
30	MAY	2	15	0	30	MAY	11	45	0	30	MAY	21	15	18	31	MAY	6	45	0
30	MAY	2	30	0	30	MAY	12	0	1	30	MAY	21	30	18	31	MAY	7	0	0
30	MAY	2	45	0	30	MAY	12	15	7	30	MAY	21	45	17	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	19	30	MAY	22	0	17	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	39	30	MAY	22	15	16	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	64	30	MAY	22	30	16	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	88	30	MAY	22	45	16	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	105	30	MAY	23	0	15	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	114	30	MAY	23	15	15	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	115	30	MAY	23	30	15	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	109	30	MAY	23	45	15	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	100	31	MAY	0	0	14	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	91	31	MAY	0	15	14	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	81	31	MAY	0	30	14	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	73	31	MAY	0	45	13	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	65	31	MAY	1	0	13	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	59	31	MAY	1	15	11	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	53	31	MAY	1	30	10	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	48	31	MAY	1	45	8	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	44	31	MAY	2	0	7	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	40	31	MAY	2	15	5	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	37	31	MAY	2	30	4	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	35	31	MAY	2	45	3	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	33	31	MAY	3	0	2	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	31	31	MAY	3	15	2	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	29	31	MAY	3	30	1	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	28	31	MAY	3	45	1	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	26	31	MAY	4	0	1					
30	MAY	9	15	0	30	MAY	18	45	25	31	MAY	4	15	1					

Table A-3. HEC-1 Output: Sub-basin 20 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0
30	MAY	0	15	0
30	MAY	0	30	0
30	MAY	0	45	0
30	MAY	1	0	0
30	MAY	1	15	0
30	MAY	1	30	0
30	MAY	1	45	0
30	MAY	2	0	0
30	MAY	2	15	0
30	MAY	2	30	0
30	MAY	2	45	0
30	MAY	3	0	0
30	MAY	3	15	0
30	MAY	3	30	0
30	MAY	3	45	0
30	MAY	4	0	0
30	MAY	4	15	0
30	MAY	4	30	0
30	MAY	4	45	0
30	MAY	5	0	0
30	MAY	5	15	0
30	MAY	5	30	0
30	MAY	5	45	0
30	MAY	6	0	0
30	MAY	6	15	0
30	MAY	6	30	0
30	MAY	6	45	0
30	MAY	7	0	0
30	MAY	7	15	0
30	MAY	7	30	0
30	MAY	7	45	0
30	MAY	8	0	0
30	MAY	8	15	0
30	MAY	8	30	0
30	MAY	8	45	0
30	MAY	9	0	0
30	MAY	9	15	0
30	MAY	9	30	0
30	MAY	9	45	0
30	MAY	10	0	0
30	MAY	10	15	0
30	MAY	10	30	0
30	MAY	10	45	0
30	MAY	11	0	0
30	MAY	11	15	0
30	MAY	11	30	0
30	MAY	11	45	2
30	MAY	12	0	13
30	MAY	12	15	34
30	MAY	12	30	65
30	MAY	12	45	94
30	MAY	13	0	112
30	MAY	13	15	118
30	MAY	13	30	114
30	MAY	13	45	103
30	MAY	14	0	88
30	MAY	14	15	77
30	MAY	14	30	68
30	MAY	14	45	60
30	MAY	15	0	53
30	MAY	15	15	48
30	MAY	15	30	43
30	MAY	15	45	39
30	MAY	16	0	36
30	MAY	16	15	33
30	MAY	16	30	31
30	MAY	16	45	29
30	MAY	17	0	27
30	MAY	17	15	26
30	MAY	17	30	25
30	MAY	17	45	23
30	MAY	18	0	22
30	MAY	18	15	21
30	MAY	18	30	20
30	MAY	18	45	20
30	MAY	19	0	19
30	MAY	19	15	18
30	MAY	19	30	18
30	MAY	19	45	17
30	MAY	20	0	17
30	MAY	20	15	16
30	MAY	20	30	16
30	MAY	20	45	16
30	MAY	21	0	15
30	MAY	21	15	15
30	MAY	21	30	15
30	MAY	21	45	14
30	MAY	22	0	14
30	MAY	22	15	14
30	MAY	22	30	14
30	MAY	22	45	13
30	MAY	23	0	13
30	MAY	23	15	13
30	MAY	23	30	13
30	MAY	23	45	12
31	MAY	0	0	12
31	MAY	0	15	12
31	MAY	0	30	11
31	MAY	0	45	10
31	MAY	1	0	9
31	MAY	1	15	7
31	MAY	1	30	5
31	MAY	1	45	4
31	MAY	2	0	3
31	MAY	2	15	2
31	MAY	2	30	2
31	MAY	2	45	1
31	MAY	3	0	1
31	MAY	3	15	1
31	MAY	3	30	0
31	MAY	3	45	0
31	MAY	4	0	0
31	MAY	4	15	0
31	MAY	4	30	0
31	MAY	4	45	0
31	MAY	5	0	0
31	MAY	5	15	0
31	MAY	5	30	0
31	MAY	5	45	0
31	MAY	6	0	0
31	MAY	6	15	0
31	MAY	6	30	0
31	MAY	6	45	0
31	MAY	7	0	0
31	MAY	7	15	0
31	MAY	7	30	0
31	MAY	7	45	0
31	MAY	8	0	0
31	MAY	8	15	0
31	MAY	8	30	0
31	MAY	8	45	0
31	MAY	9	0	0
31	MAY	9	15	0
31	MAY	9	30	0
31	MAY	9	45	0
31	MAY	10	0	0
31	MAY	10	15	0
31	MAY	10	30	0
31	MAY	10	45	0
31	MAY	11	0	0
31	MAY	11	15	0
31	MAY	11	30	0
31	MAY	11	45	0
31	MAY	12	0	0
31	MAY	12	15	0
31	MAY	12	30	0
31	MAY	12	45	0
31	MAY	13	0	0
31	MAY	13	15	0

Table A-4. HEC-1 Output: Combination of Routed Sub-basin 10 Hydrograph and Sub-basin 20 Hydrograph.

Day	Month	Hr.	Min	FLOW (CFS)	Day	Month	Hr.	Min	FLOW (CFS)	Day	Month	Hr.	Min	FLOW (CFS)	Day	Month	Hr.	Min	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	43	31	MAY	4	30	1
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	41	31	MAY	4	45	0
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	40	31	MAY	5	0	0
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	39	31	MAY	5	15	0
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	38	31	MAY	5	30	0
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	36	31	MAY	5	45	0
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	35	31	MAY	6	0	0
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	35	31	MAY	6	15	0
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	34	31	MAY	6	30	0
30	MAY	2	15	0	30	MAY	11	45	2	30	MAY	21	15	33	31	MAY	6	45	0
30	MAY	2	30	0	30	MAY	12	0	14	30	MAY	21	30	32	31	MAY	7	0	0
30	MAY	2	45	0	30	MAY	12	15	40	30	MAY	21	45	31	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	83	30	MAY	22	0	31	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	133	30	MAY	22	15	30	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	176	30	MAY	22	30	30	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	206	30	MAY	22	45	29	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	219	30	MAY	23	0	28	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	217	30	MAY	23	15	28	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	204	30	MAY	23	30	27	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	186	30	MAY	23	45	27	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	168	31	MAY	0	0	27	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	150	31	MAY	0	15	26	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	134	31	MAY	0	30	25	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	120	31	MAY	0	45	23	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	108	31	MAY	1	0	21	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	98	31	MAY	1	15	18	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	89	31	MAY	1	30	15	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	81	31	MAY	1	45	12	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	75	31	MAY	2	0	10	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	69	31	MAY	2	15	8	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	65	31	MAY	2	30	6	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	61	31	MAY	2	45	4	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	57	31	MAY	3	0	3	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	54	31	MAY	3	15	2	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	51	31	MAY	3	30	2	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	49	31	MAY	3	45	1	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	47	31	MAY	4	0	1					
30	MAY	9	15	0	30	MAY	18	45	45	31	MAY	4	15	1					

Table A-5. HEC-1 Output: Station 2 Hydrograph Routed to Station 3.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	45	31	MAY	4	30	1
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	43	31	MAY	4	45	1
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	42	31	MAY	5	0	0
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	40	31	MAY	5	15	0
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	39	31	MAY	5	30	0
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	38	31	MAY	5	45	0
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	37	31	MAY	6	0	0
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	36	31	MAY	6	15	0
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	35	31	MAY	6	30	0
30	MAY	2	15	0	30	MAY	11	45	0	30	MAY	21	15	34	31	MAY	6	45	0
30	MAY	2	30	0	30	MAY	12	0	4	30	MAY	21	30	33	31	MAY	7	0	0
30	MAY	2	45	0	30	MAY	12	15	16	30	MAY	21	45	32	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	41	30	MAY	22	0	32	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	80	30	MAY	22	15	31	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	125	30	MAY	22	30	30	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	166	30	MAY	22	45	30	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	197	30	MAY	23	0	29	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	212	30	MAY	23	15	29	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	213	30	MAY	23	30	28	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	203	30	MAY	23	45	28	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	188	31	MAY	0	0	27	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	171	31	MAY	0	15	27	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	153	31	MAY	0	30	26	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	137	31	MAY	0	45	25	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	123	31	MAY	1	0	24	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	111	31	MAY	1	15	21	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	100	31	MAY	1	30	19	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	91	31	MAY	1	45	16	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	83	31	MAY	2	0	13	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	76	31	MAY	2	15	10	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	71	31	MAY	2	30	8	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	66	31	MAY	2	45	6	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	62	31	MAY	3	0	5	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	58	31	MAY	3	15	4	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	55	31	MAY	3	30	3	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	52	31	MAY	3	45	2	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	49	31	MAY	4	0	1					
30	MAY	9	15	0	30	MAY	18	45	47	31	MAY	4	15	1					

Table A-6. HEC-1 Output: Sub-basin 30 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	33	31	MAY	4	30	2
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	32	31	MAY	4	45	2
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	30	31	MAY	5	0	2
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	29	31	MAY	5	15	1
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	28	31	MAY	5	30	1
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	27	31	MAY	5	45	1
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	26	31	MAY	6	0	1
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	25	31	MAY	6	15	1
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	24	31	MAY	6	30	1
30	MAY	2	15	0	30	MAY	11	45	1	30	MAY	21	15	23	31	MAY	6	45	0
30	MAY	2	30	0	30	MAY	12	0	3	30	MAY	21	30	22	31	MAY	7	0	0
30	MAY	2	45	0	30	MAY	12	15	8	30	MAY	21	45	22	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	16	30	MAY	22	0	21	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	27	30	MAY	22	15	21	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	40	30	MAY	22	30	20	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	55	30	MAY	22	45	19	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	69	30	MAY	23	0	19	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	81	30	MAY	23	15	18	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	89	30	MAY	23	30	18	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	94	30	MAY	23	45	18	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	96	31	MAY	0	0	17	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	96	31	MAY	0	15	17	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	94	31	MAY	0	30	16	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	89	31	MAY	0	45	16	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	83	31	MAY	1	0	15	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	77	31	MAY	1	15	14	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	71	31	MAY	1	30	13	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	66	31	MAY	1	45	12	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	61	31	MAY	2	0	11	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	57	31	MAY	2	15	10	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	54	31	MAY	2	30	9	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	50	31	MAY	2	45	7	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	47	31	MAY	3	0	6	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	44	31	MAY	3	15	5	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	42	31	MAY	3	30	4	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	39	31	MAY	3	45	4	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	37	31	MAY	4	0	3					
30	MAY	9	15	0	30	MAY	18	45	35	31	MAY	4	15	3					

Table A-7. HEC-1 Output: Sub-basin 40 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	5	31	MAY	4	30	0
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	5	31	MAY	4	45	0
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	5	31	MAY	5	0	0
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	4	31	MAY	5	15	0
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	4	31	MAY	5	30	0
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	4	31	MAY	5	45	0
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	4	31	MAY	6	0	0
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	4	31	MAY	6	15	0
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	4	31	MAY	6	30	0
30	MAY	2	15	0	30	MAY	11	45	4	30	MAY	21	15	4	31	MAY	6	45	0
30	MAY	2	30	0	30	MAY	12	0	21	30	MAY	21	30	4	31	MAY	7	0	0
30	MAY	2	45	0	30	MAY	12	15	46	30	MAY	21	45	4	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	53	30	MAY	22	0	4	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	45	30	MAY	22	15	4	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	35	30	MAY	22	30	4	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	27	30	MAY	22	45	4	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	21	30	MAY	23	0	3	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	17	30	MAY	23	15	3	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	15	30	MAY	23	30	3	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	13	30	MAY	23	45	3	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	11	31	MAY	0	0	3	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	10	31	MAY	0	15	3	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	10	31	MAY	0	30	2	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	9	31	MAY	0	45	1	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	8	31	MAY	1	0	1	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	8	31	MAY	1	15	0	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	7	31	MAY	1	30	0	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	7	31	MAY	1	45	0	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	7	31	MAY	2	0	0	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	6	31	MAY	2	15	0	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	6	31	MAY	2	30	0	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	6	31	MAY	2	45	0	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	6	31	MAY	3	0	0	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	6	31	MAY	3	15	0	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	5	31	MAY	3	30	0	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	5	31	MAY	3	45	0	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	5	31	MAY	4	0	0					
30	MAY	9	15	0	30	MAY	18	45	5	31	MAY	4	15	0					

Table A-8. Combination of Station 3 Hydrograph, Sub-basin 30 Hydrograph, and Sub-basin 40 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	83	31	MAY	4	30	3
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	80	31	MAY	4	45	2
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	77	31	MAY	5	0	2
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	74	31	MAY	5	15	2
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	71	31	MAY	5	30	1
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	69	31	MAY	5	45	1
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	67	31	MAY	6	0	1
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	65	31	MAY	6	15	1
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	63	31	MAY	6	30	1
30	MAY	2	15	0	30	MAY	11	45	5	30	MAY	21	15	61	31	MAY	6	45	0
30	MAY	2	30	0	30	MAY	12	0	28	30	MAY	21	30	59	31	MAY	7	0	0
30	MAY	2	45	0	30	MAY	12	15	70	30	MAY	21	45	58	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	110	30	MAY	22	0	56	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	152	30	MAY	22	15	55	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	200	30	MAY	22	30	54	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	249	30	MAY	22	45	53	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	287	30	MAY	23	0	52	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	310	30	MAY	23	15	50	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	316	30	MAY	23	30	49	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	310	30	MAY	23	45	48	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	296	31	MAY	0	0	48	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	277	31	MAY	0	15	46	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	257	31	MAY	0	30	45	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	236	31	MAY	0	45	42	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	215	31	MAY	1	0	39	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	195	31	MAY	1	15	36	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	179	31	MAY	1	30	32	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	164	31	MAY	1	45	28	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	151	31	MAY	2	0	24	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	140	31	MAY	2	15	20	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	130	31	MAY	2	30	17	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	122	31	MAY	2	45	14	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	114	31	MAY	3	0	11	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	108	31	MAY	3	15	9	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	102	31	MAY	3	30	7	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	96	31	MAY	3	45	6	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	91	31	MAY	4	0	5					
30	MAY	9	15	0	30	MAY	18	45	87	31	MAY	4	15	4					

Table A-9. HEC-1 Output: Station 3 Hydrograph Routed to Station 4.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	89	31	MAY	4	30	4
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	85	31	MAY	4	45	3
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	81	31	MAY	5	0	3
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	78	31	MAY	5	15	2
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	75	31	MAY	5	30	2
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	72	31	MAY	5	45	1
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	70	31	MAY	6	0	1
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	67	31	MAY	6	15	1
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	65	31	MAY	6	30	1
30	MAY	2	15	0	30	MAY	11	45	1	30	MAY	21	15	63	31	MAY	6	45	1
30	MAY	2	30	0	30	MAY	12	0	7	30	MAY	21	30	62	31	MAY	7	0	1
30	MAY	2	45	0	30	MAY	12	15	27	30	MAY	21	45	60	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	61	30	MAY	22	0	58	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	98	30	MAY	22	15	57	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	140	30	MAY	22	30	56	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	186	30	MAY	22	45	54	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	232	30	MAY	23	0	53	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	271	30	MAY	23	15	52	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	297	30	MAY	23	30	51	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	309	30	MAY	23	45	50	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	307	31	MAY	0	0	49	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	297	31	MAY	0	15	48	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	281	31	MAY	0	30	47	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	262	31	MAY	0	45	45	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	242	31	MAY	1	0	43	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	222	31	MAY	1	15	40	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	202	31	MAY	1	30	37	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	185	31	MAY	1	45	33	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	169	31	MAY	2	0	29	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	156	31	MAY	2	15	25	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	144	31	MAY	2	30	21	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	134	31	MAY	2	45	18	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	125	31	MAY	3	0	15	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	117	31	MAY	3	15	12	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	110	31	MAY	3	30	10	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	104	31	MAY	3	45	8	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	98	31	MAY	4	0	6					
30	MAY	9	15	0	30	MAY	18	45	93	31	MAY	4	15	5					

Table A-10. HEC-1 Output: Sub-basin 50 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	15	5	31	MAY	4	45	0
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	30	5	31	MAY	4	0	0
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	45	4	31	MAY	5	15	0
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	0	4	31	MAY	5	30	0
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	15	4	31	MAY	5	45	0
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	30	4	31	MAY	5	0	0
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	45	4	31	MAY	6	15	0
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	0	4	31	MAY	6	30	0
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	15	4	31	MAY	6	45	0
30	MAY	2	15	0	30	MAY	11	45	2	30	MAY	21	30	4	31	MAY	6	0	0
30	MAY	2	30	0	30	MAY	12	0	11	30	MAY	21	45	4	31	MAY	7	15	0
30	MAY	2	45	0	30	MAY	12	15	28	30	MAY	21	0	4	31	MAY	7	30	0
30	MAY	3	0	0	30	MAY	12	30	40	30	MAY	22	15	4	31	MAY	7	45	0
30	MAY	3	15	0	30	MAY	12	45	43	30	MAY	22	30	4	31	MAY	7	0	0
30	MAY	3	30	0	30	MAY	13	0	38	30	MAY	22	45	3	31	MAY	8	15	0
30	MAY	3	45	0	30	MAY	13	15	30	30	MAY	22	0	3	31	MAY	8	30	0
30	MAY	4	0	0	30	MAY	13	30	25	30	MAY	23	15	3	31	MAY	8	45	0
30	MAY	4	15	0	30	MAY	13	45	20	30	MAY	23	30	3	31	MAY	8	0	0
30	MAY	4	30	0	30	MAY	14	0	17	30	MAY	23	45	3	31	MAY	9	15	0
30	MAY	4	45	0	30	MAY	14	15	14	30	MAY	23	0	3	31	MAY	9	30	0
30	MAY	5	0	0	30	MAY	14	30	13	31	MAY	0	15	3	31	MAY	9	45	0
30	MAY	5	15	0	30	MAY	14	45	11	31	MAY	0	30	3	31	MAY	9	0	0
30	MAY	5	30	0	30	MAY	15	0	10	31	MAY	0	45	3	31	MAY	10	15	0
30	MAY	5	45	0	30	MAY	15	15	9	31	MAY	0	0	2	31	MAY	10	30	0
30	MAY	6	0	0	30	MAY	15	30	9	31	MAY	1	15	1	31	MAY	10	45	0
30	MAY	6	15	0	30	MAY	15	45	8	31	MAY	1	30	1	31	MAY	10	0	0
30	MAY	6	30	0	30	MAY	16	0	8	31	MAY	1	45	0	31	MAY	11	15	0
30	MAY	6	45	0	30	MAY	16	15	7	31	MAY	1	0	0	31	MAY	11	30	0
30	MAY	7	0	0	30	MAY	16	30	7	31	MAY	2	15	0	31	MAY	11	45	0
30	MAY	7	15	0	30	MAY	16	45	6	31	MAY	2	30	0	31	MAY	11	0	0
30	MAY	7	30	0	30	MAY	17	0	6	31	MAY	2	45	0	31	MAY	12	15	0
30	MAY	7	45	0	30	MAY	17	15	6	31	MAY	2	0	0	31	MAY	12	30	0
30	MAY	8	0	0	30	MAY	17	30	6	31	MAY	3	15	0	31	MAY	12	45	0
30	MAY	8	15	0	30	MAY	17	45	6	31	MAY	3	30	0	31	MAY	12	0	0
30	MAY	8	30	0	30	MAY	18	0	5	31	MAY	3	45	0	31	MAY	13	15	0
30	MAY	8	45	0	30	MAY	18	15	5	31	MAY	3	0	0	31	MAY	13	30	0
30	MAY	9	0	0	30	MAY	18	30	5	31	MAY	4	15	0					
30	MAY	9	15	0	30	MAY	18	0	5	31	MAY	4	30	0					

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Table A-11. HEC-1 Output: Combination of Station 4 Hydrograph and Sub-basin 50 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	93	31	MAY	4	30	4
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	89	31	MAY	4	45	3
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	85	31	MAY	5	0	3
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	82	31	MAY	5	15	2
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	79	31	MAY	5	30	2
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	76	31	MAY	5	45	1
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	74	31	MAY	6	0	1
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	71	31	MAY	6	15	1
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	69	31	MAY	6	30	1
30	MAY	2	15	0	30	MAY	11	45	3	30	MAY	21	15	67	31	MAY	6	45	1
30	MAY	2	30	0	30	MAY	12	0	18	30	MAY	21	30	65	31	MAY	7	0	1
30	MAY	2	45	0	30	MAY	12	15	55	30	MAY	21	45	64	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	101	30	MAY	22	0	62	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	141	30	MAY	22	15	60	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	178	30	MAY	22	30	59	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	216	30	MAY	22	45	58	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	257	30	MAY	23	0	56	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	291	30	MAY	23	15	55	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	314	30	MAY	23	30	54	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	323	30	MAY	23	45	53	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	320	31	MAY	0	0	52	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	308	31	MAY	0	15	51	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	292	31	MAY	0	30	49	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	272	31	MAY	0	45	47	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	251	31	MAY	1	0	44	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	230	31	MAY	1	15	41	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	210	31	MAY	1	30	37	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	192	31	MAY	1	45	34	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	176	31	MAY	2	0	30	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	163	31	MAY	2	15	25	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	151	31	MAY	2	30	21	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	140	31	MAY	2	45	18	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	131	31	MAY	3	0	15	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	123	31	MAY	3	15	12	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	115	31	MAY	3	30	10	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	109	31	MAY	3	45	8	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	103	31	MAY	4	0	6					
30	MAY	9	15	0	30	MAY	18	45	98	31	MAY	4	15	5					

Table A-12. HEC-1 Output: Station 4 Hydrograph Routed to Station 5.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	97	31	MAY	4	30	5
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	92	31	MAY	4	45	4
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	88	31	MAY	5	0	3
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	85	31	MAY	5	15	3
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	81	31	MAY	5	30	2
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	78	31	MAY	5	45	2
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	76	31	MAY	6	0	1
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	73	31	MAY	6	15	1
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	71	31	MAY	6	30	1
30	MAY	2	15	0	30	MAY	11	45	1	30	MAY	21	15	69	31	MAY	6	45	1
30	MAY	2	30	0	30	MAY	12	0	7	30	MAY	21	30	67	31	MAY	7	0	1
30	MAY	2	45	0	30	MAY	12	15	29	30	MAY	21	45	65	31	MAY	7	15	1
30	MAY	3	0	0	30	MAY	12	30	67	30	MAY	22	0	63	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	111	30	MAY	22	15	62	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	150	30	MAY	22	30	60	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	188	30	MAY	22	45	59	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	227	30	MAY	23	0	57	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	265	30	MAY	23	15	56	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	296	30	MAY	23	30	55	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	315	30	MAY	23	45	54	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	321	31	MAY	0	0	53	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	316	31	MAY	0	15	52	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	304	31	MAY	0	30	50	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	286	31	MAY	0	45	49	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	266	31	MAY	1	0	46	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	245	31	MAY	1	15	43	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	225	31	MAY	1	30	40	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	205	31	MAY	1	45	36	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	188	31	MAY	2	0	33	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	173	31	MAY	2	15	29	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	160	31	MAY	2	30	24	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	148	31	MAY	2	45	21	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	138	31	MAY	3	0	17	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	129	31	MAY	3	15	14	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	121	31	MAY	3	30	11	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	114	31	MAY	3	45	9	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	108	31	MAY	4	0	7					
30	MAY	9	15	0	30	MAY	18	45	102	31	MAY	4	15	6					

Table A-13. HEC-1 Output: Sub-basin 60 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	5	31	MAY	4	30	0
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	5	31	MAY	4	45	0
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	5	31	MAY	5	0	0
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	5	31	MAY	5	15	0
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	5	31	MAY	5	30	0
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	4	31	MAY	5	45	0
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	4	31	MAY	6	0	0
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	4	31	MAY	6	15	0
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	4	31	MAY	6	30	0
30	MAY	2	15	0	30	MAY	11	45	1	30	MAY	21	15	4	31	MAY	6	45	0
30	MAY	2	30	0	30	MAY	12	0	5	30	MAY	21	30	4	31	MAY	7	0	0
30	MAY	2	45	0	30	MAY	12	15	13	30	MAY	21	45	4	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	24	30	MAY	22	0	4	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	32	30	MAY	22	15	4	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	36	30	MAY	22	30	4	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	35	30	MAY	22	45	4	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	31	30	MAY	23	0	4	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	26	30	MAY	23	15	4	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	23	30	MAY	23	30	3	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	20	30	MAY	23	45	3	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	17	31	MAY	0	0	3	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	15	31	MAY	0	15	3	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	13	31	MAY	0	30	3	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	12	31	MAY	0	45	3	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	11	31	MAY	1	0	2	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	10	31	MAY	1	15	2	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	9	31	MAY	1	30	1	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	9	31	MAY	1	45	1	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	8	31	MAY	2	0	1	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	8	31	MAY	2	15	0	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	7	31	MAY	2	30	0	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	7	31	MAY	2	45	0	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	6	31	MAY	3	0	0	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	6	31	MAY	3	15	0	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	6	31	MAY	3	30	0	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	6	31	MAY	3	45	0	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	5	31	MAY	4	0	0					
30	MAY	9	15	0	30	MAY	18	45	5	31	MAY	4	15	0					

Table A-14. HEC-1 Output: Combination of Station 5 Hydrograph and Sub-basin 60 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	102	31	MAY	4	30	5
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	97	31	MAY	4	45	4
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	93	31	MAY	5	0	3
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	89	31	MAY	5	15	3
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	86	31	MAY	5	30	2
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	83	31	MAY	5	45	2
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	80	31	MAY	6	0	1
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	77	31	MAY	6	15	1
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	75	31	MAY	6	30	1
30	MAY	2	15	0	30	MAY	11	45	2	30	MAY	21	15	73	31	MAY	6	45	1
30	MAY	2	30	0	30	MAY	12	0	12	30	MAY	21	30	71	31	MAY	7	0	1
30	MAY	2	45	0	30	MAY	12	15	42	30	MAY	21	45	69	31	MAY	7	15	1
30	MAY	3	0	0	30	MAY	12	30	92	30	MAY	22	0	67	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	143	30	MAY	22	15	65	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	186	30	MAY	22	30	64	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	223	30	MAY	22	45	62	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	258	30	MAY	23	0	61	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	292	30	MAY	23	15	60	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	319	30	MAY	23	30	58	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	335	30	MAY	23	45	57	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	338	31	MAY	0	0	56	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	331	31	MAY	0	15	55	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	317	31	MAY	0	30	53	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	298	31	MAY	0	45	51	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	277	31	MAY	1	0	48	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	255	31	MAY	1	15	45	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	234	31	MAY	1	30	41	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	214	31	MAY	1	45	37	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	196	31	MAY	2	0	33	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	180	31	MAY	2	15	29	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	167	31	MAY	2	30	25	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	155	31	MAY	2	45	21	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	144	31	MAY	3	0	17	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	135	31	MAY	3	15	14	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	127	31	MAY	3	30	12	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	119	31	MAY	3	45	9	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	113	31	MAY	4	0	7					
30	MAY	9	15	0	30	MAY	18	45	107	31	MAY	4	15	6					

Table A-15. HEC-1 Output: Station 5 Hydrograph Routed to Station 6.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	112	31	MAY	4	30	7
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	106	31	MAY	4	45	6
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	101	31	MAY	5	0	5
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	97	31	MAY	5	15	4
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	92	31	MAY	5	30	3
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	89	31	MAY	5	45	3
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	85	31	MAY	6	0	2
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	82	31	MAY	6	15	2
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	79	31	MAY	6	30	1
30	MAY	2	15	0	30	MAY	11	45	0	30	MAY	21	15	77	31	MAY	6	45	1
30	MAY	2	30	0	30	MAY	12	0	2	30	MAY	21	30	75	31	MAY	7	0	1
30	MAY	2	45	0	30	MAY	12	15	10	30	MAY	21	45	72	31	MAY	7	15	1
30	MAY	3	0	0	30	MAY	12	30	31	30	MAY	22	0	70	31	MAY	7	30	1
30	MAY	3	15	0	30	MAY	12	45	67	30	MAY	22	15	68	31	MAY	7	45	1
30	MAY	3	30	0	30	MAY	13	0	111	30	MAY	22	30	67	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	154	30	MAY	22	45	65	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	193	30	MAY	23	0	64	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	230	30	MAY	23	15	62	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	265	30	MAY	23	30	61	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	295	30	MAY	23	45	59	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	316	31	MAY	0	0	58	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	327	31	MAY	0	15	57	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	328	31	MAY	0	30	56	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	321	31	MAY	0	45	54	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	307	31	MAY	1	0	52	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	290	31	MAY	1	15	50	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	270	31	MAY	1	30	47	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	249	31	MAY	1	45	43	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	229	31	MAY	2	0	40	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	210	31	MAY	2	15	36	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	193	31	MAY	2	30	32	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	178	31	MAY	2	45	28	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	165	31	MAY	3	0	24	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	153	31	MAY	3	15	20	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	143	31	MAY	3	30	17	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	134	31	MAY	3	45	14	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	126	31	MAY	4	0	11					
30	MAY	9	15	0	30	MAY	18	45	118	31	MAY	4	15	9					

Table A-16. HEC-1 Output: Sub-basin 70 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	19	31	MAY	4	30	0
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	18	31	MAY	4	45	0
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	17	31	MAY	5	0	0
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	17	31	MAY	5	15	0
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	16	31	MAY	5	30	0
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	16	31	MAY	5	45	0
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	15	31	MAY	6	0	0
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	15	31	MAY	6	15	0
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	14	31	MAY	6	30	0
30	MAY	2	15	0	30	MAY	11	45	1	30	MAY	21	15	14	31	MAY	6	45	0
30	MAY	2	30	0	30	MAY	12	0	6	30	MAY	21	30	14	31	MAY	7	0	0
30	MAY	2	45	0	30	MAY	12	15	15	30	MAY	21	45	13	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	30	30	MAY	22	0	13	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	48	30	MAY	22	15	13	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	66	30	MAY	22	30	12	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	78	30	MAY	22	45	12	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	85	30	MAY	23	0	12	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	87	30	MAY	23	15	12	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	85	30	MAY	23	30	12	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	79	30	MAY	23	45	11	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	70	31	MAY	0	0	11	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	63	31	MAY	0	15	11	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	56	31	MAY	0	30	11	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	51	31	MAY	0	45	10	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	46	31	MAY	1	0	9	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	42	31	MAY	1	15	8	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	39	31	MAY	1	30	7	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	36	31	MAY	1	45	6	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	33	31	MAY	2	0	5	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	30	31	MAY	2	15	4	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	28	31	MAY	2	30	3	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	27	31	MAY	2	45	2	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	25	31	MAY	3	0	2	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	24	31	MAY	3	15	1	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	22	31	MAY	3	30	1	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	21	31	MAY	3	45	1	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	20	31	MAY	4	0	1					
30	MAY	9	15	0	30	MAY	18	45	19	31	MAY	4	15	1					

Table A-17. HEC-1 Output: Sub-basin 80 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	7	31	MAY	4	30	0
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	6	31	MAY	4	45	0
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	6	31	MAY	5	0	0
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	6	31	MAY	5	15	0
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	6	31	MAY	5	30	0
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	6	31	MAY	5	45	0
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	6	31	MAY	6	0	0
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	5	31	MAY	6	15	0
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	5	31	MAY	6	30	0
30	MAY	2	15	0	30	MAY	11	45	1	30	MAY	21	15	5	31	MAY	6	45	0
30	MAY	2	30	0	30	MAY	12	0	5	30	MAY	21	30	5	31	MAY	7	0	0
30	MAY	2	45	0	30	MAY	12	15	13	30	MAY	21	45	5	31	MAY	7	15	0
30	MAY	3	0	0	30	MAY	12	30	26	30	MAY	22	0	5	31	MAY	7	30	0
30	MAY	3	15	0	30	MAY	12	45	36	30	MAY	22	15	5	31	MAY	7	45	0
30	MAY	3	30	0	30	MAY	13	0	42	30	MAY	22	30	5	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	43	30	MAY	22	45	5	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	40	30	MAY	23	0	5	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	35	30	MAY	23	15	4	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	30	30	MAY	23	30	4	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	26	30	MAY	23	45	4	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	23	31	MAY	0	0	4	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	20	31	MAY	0	15	4	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	18	31	MAY	0	30	4	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	16	31	MAY	0	45	3	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	15	31	MAY	1	0	3	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	13	31	MAY	1	15	2	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	12	31	MAY	1	30	2	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	11	31	MAY	1	45	1	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	11	31	MAY	2	0	1	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	10	31	MAY	2	15	1	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	9	31	MAY	2	30	0	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	9	31	MAY	2	45	0	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	8	31	MAY	3	0	0	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	8	31	MAY	3	15	0	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	8	31	MAY	3	30	0	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	7	31	MAY	3	45	0	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	7	31	MAY	4	0	0					
30	MAY	9	15	0	30	MAY	18	45	7	31	MAY	4	15	0					

Table A-18. HEC-1 Output: Combination of Station 6 Hydrograph, Sub-basin 70 Hydrograph, and Sub-basin 80 Hydrograph.

Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)	Day	Month	Hr.	Min.	FLOW (CFS)
30	MAY	0	0	0	30	MAY	9	30	0	30	MAY	19	0	137	31	MAY	4	30	8
30	MAY	0	15	0	30	MAY	9	45	0	30	MAY	19	15	131	31	MAY	4	45	6
30	MAY	0	30	0	30	MAY	10	0	0	30	MAY	19	30	125	31	MAY	5	0	5
30	MAY	0	45	0	30	MAY	10	15	0	30	MAY	19	45	119	31	MAY	5	15	4
30	MAY	1	0	0	30	MAY	10	30	0	30	MAY	20	0	114	31	MAY	5	30	3
30	MAY	1	15	0	30	MAY	10	45	0	30	MAY	20	15	110	31	MAY	5	45	3
30	MAY	1	30	0	30	MAY	11	0	0	30	MAY	20	30	106	31	MAY	6	0	2
30	MAY	1	45	0	30	MAY	11	15	0	30	MAY	20	45	102	31	MAY	6	15	2
30	MAY	2	0	0	30	MAY	11	30	0	30	MAY	21	0	99	31	MAY	6	30	1
30	MAY	2	15	0	30	MAY	11	45	2	30	MAY	21	15	96	31	MAY	6	45	1
30	MAY	2	30	0	30	MAY	12	0	13	30	MAY	21	30	93	31	MAY	7	0	1
30	MAY	2	45	0	30	MAY	12	15	38	30	MAY	21	45	91	31	MAY	7	15	1
30	MAY	3	0	0	30	MAY	12	30	86	30	MAY	22	0	88	31	MAY	7	30	1
30	MAY	3	15	0	30	MAY	12	45	152	30	MAY	22	15	86	31	MAY	7	45	1
30	MAY	3	30	0	30	MAY	13	0	218	30	MAY	22	30	84	31	MAY	8	0	0
30	MAY	3	45	0	30	MAY	13	15	275	30	MAY	22	45	82	31	MAY	8	15	0
30	MAY	4	0	0	30	MAY	13	30	319	30	MAY	23	0	80	31	MAY	8	30	0
30	MAY	4	15	0	30	MAY	13	45	353	30	MAY	23	15	78	31	MAY	8	45	0
30	MAY	4	30	0	30	MAY	14	0	380	30	MAY	23	30	77	31	MAY	9	0	0
30	MAY	4	45	0	30	MAY	14	15	400	30	MAY	23	45	75	31	MAY	9	15	0
30	MAY	5	0	0	30	MAY	14	30	410	31	MAY	0	0	74	31	MAY	9	30	0
30	MAY	5	15	0	30	MAY	14	45	410	31	MAY	0	15	72	31	MAY	9	45	0
30	MAY	5	30	0	30	MAY	15	0	403	31	MAY	0	30	70	31	MAY	10	0	0
30	MAY	5	45	0	30	MAY	15	15	388	31	MAY	0	45	68	31	MAY	10	15	0
30	MAY	6	0	0	30	MAY	15	30	368	31	MAY	1	0	64	31	MAY	10	30	0
30	MAY	6	15	0	30	MAY	15	45	345	31	MAY	1	15	60	31	MAY	10	45	0
30	MAY	6	30	0	30	MAY	16	0	321	31	MAY	1	30	55	31	MAY	11	0	0
30	MAY	6	45	0	30	MAY	16	15	296	31	MAY	1	45	50	31	MAY	11	15	0
30	MAY	7	0	0	30	MAY	16	30	272	31	MAY	2	0	45	31	MAY	11	30	0
30	MAY	7	15	0	30	MAY	16	45	251	31	MAY	2	15	40	31	MAY	11	45	0
30	MAY	7	30	0	30	MAY	17	0	231	31	MAY	2	30	35	31	MAY	12	0	0
30	MAY	7	45	0	30	MAY	17	15	214	31	MAY	2	45	30	31	MAY	12	15	0
30	MAY	8	0	0	30	MAY	17	30	198	31	MAY	3	0	26	31	MAY	12	30	0
30	MAY	8	15	0	30	MAY	17	45	185	31	MAY	3	15	22	31	MAY	12	45	0
30	MAY	8	30	0	30	MAY	18	0	173	31	MAY	3	30	18	31	MAY	13	0	0
30	MAY	8	45	0	30	MAY	18	15	162	31	MAY	3	45	15	31	MAY	13	15	0
30	MAY	9	0	0	30	MAY	18	30	153	31	MAY	4	0	12					
30	MAY	9	15	0	30	MAY	18	45	145	31	MAY	4	15	10					

APPENDIX B

March 1988 and October 1989 Soil Sample Analysis

MARCH 1988

Soil Sample Analysis

iml

Inter·Mountain Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

EL PASO NATURAL GAS
KIRTLAND, NEW MEXICO
Mine: SAN JUAN RIVER PLANT
PROJECT #63708

Date Reported: April 11, 1988

Lab No.	Location	Depths	EC mmhos/cm @ 25C
987	#3	0.0-1.0	36.5
988	#3	1.0-2.0	28.1
989	#3	2.0-3.0	21.2
990	#4	0.0-1.0	29.4
991	#4	1.0-2.0	37.2
992	#4	2.0-3.0	38.4
993	#4	3.0-4.0	27.3
994	#5	0.0-1.0	22.9
995	#5	1.0-2.0	19.2
996	#5	2.0-3.0	18.4
997	#5	3.0-4.0	14.2
998	#6	0.0-1.0	20.9
999	#6	1.0-2.0	14.3
1000	#6	2.0-3.0	10.3
1001	#7	0.0-1.0	42.5
1002	#7	1.0-2.0	37.2
1003	#7	2.0-3.0	33.9
1004	#7	3.0-4.0	19.6
1005	#11	0.0-1.0	5.83
1006	#11	1.0-2.0	20.1

Inter·Mountain Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
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EL PASO NATURAL GAS
KIRTLAND, NEW MEXICO
Mine: SAN JUAN RIVER PLANT
PROJECT #63708

Date Reported: April 11, 1988

Lab No.	Location	Depths	EC mmhos/cm @ 25C
[illegible]	#11	2.0-3.0	20.4
[illegible]	#12	0.0-1.0	1.37
[illegible]	#12	1.0-2.0	24.6
[illegible]	#12	2.0-3.0	24.0
[illegible]	#13	0.0-1.0	1.85
[illegible]	#13	1.0-2.0	1.14
[illegible]	#13	2.0-3.0	23.4
[illegible]	#13	3.0-4.0	23.3

OCTOBER 1989

Soil Sample Analysis

K. W. Brown & Associates, Inc.
Analytical Services
6 Graham Road College Station, TX 77845
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El Paso Natural Gas
Sid Johnson
Date: 11/28/89
Facility: San Juan River Project
Account No.: 63715
Lab ID: 8910015

Electrical Conductivity Analysis

Sample ID	Saturated Paste EC (umhos)	Sample ID	Saturated Paste EC (umhos)
A: 0-1"	38200	I: 0-1"	13580
1-2"	27500	1-2"	27700
2-3"	23900	2-3"	26500
3-4"	8140	3-4"	25800
B: 0-1"	4890	J: 0-1"	51900
1-2"	1032	1-2"	39100
2-3"	3040	2-3"	34100
3-4"	7470	3-4"	25500
C: 0-1"	44700	K: 0-1"	22400
1-2"	51000	1-2"	28700
2-3"	49200	2-3"	25290
3-4"	13720	3-4"	19660
D: 0-1"	14400	L: 0-1"	19200
1-2"	15000	1-2"	15990
2-3"	20400	2-3"	13780
3-4"	19810	3-4"	13700
E: 0-1"	17590	M: 0-1"	34400
1-2"	19270	1-2"	19130
2-3"	20300	2-3"	18190
3-4"	19820	3-4"	19310
F: 0-1"	5500	N: 0-1"	110700
1-2"	24300	1-2"	76200
2-3"	27400	2-3"	54500
3-4"	16000	3-4"	45800
G: 0-1"	11070	O: 0-1"	56800
1-2"	18540	1-2"	23600
2-3"	15910	2-3"	29500
3-4"	15280	3-4"	28900
H: 0-1"	27400	P: 0-1"	13780

1-2"	41600	1-2"	8580
2-3"	36600	2-3"	4580
3-4"	44100	3-4"	4300

Quality Control Data

El Paso Natural Gas
San Juan River Project

Electrical Conductivity

Sample Group	EC umhos/cm
A thru F	7970
G thru K	7530
L thru P	6180
Reruns	8130

Mean	7453
Std (Sample Population)	767

K. W. Brown & Associates
Analytical Services

6 Graham
Road
College Station, TX 77840
Phone: 409-690-0051
FAX: 409-690-7310

El Paso Natural Gas
San Juan River
Project
Attn: Sid Johnson

Account No.: 63715
Lab I.D.: 8910015

Date: 11/28/89

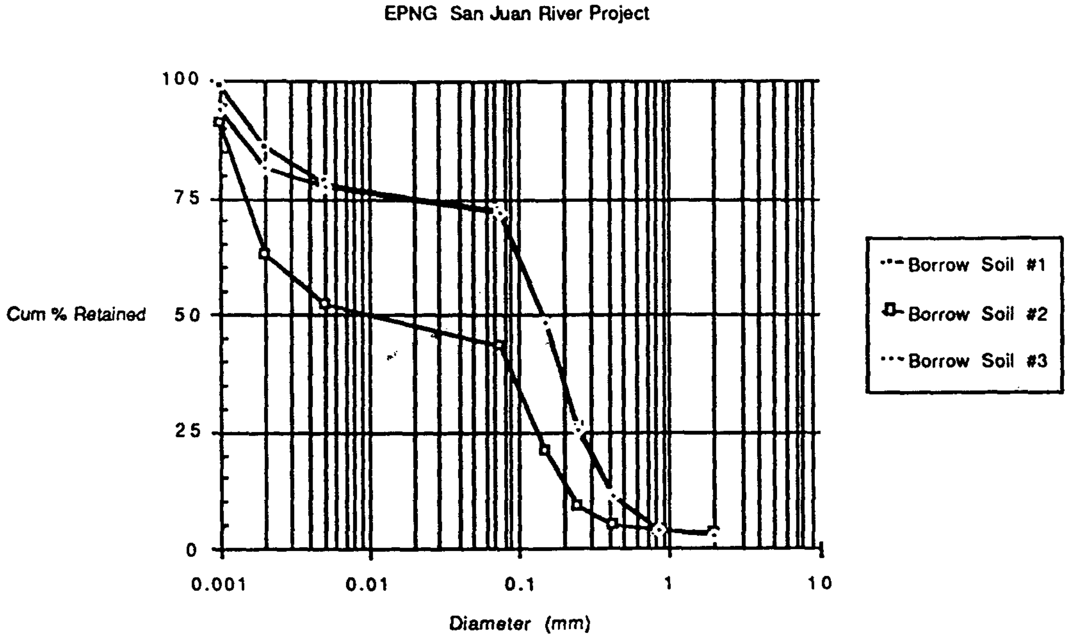
Soil Mechanical Analysis

	Texture			Soil Reaction		
	Sand	Silt	Clay	Gravel		
USDA (mm)	.05 - 2.00	.002 to .05	<.002	2.00	pH	EC
U.S. Sieve (mesh)	270 to 10			10		
Sample ID	Percent Retained on Sieve					umhos/cm
Borrow Soil #1	71.4	12.3	13.2	2.0		868
Borrow Soil #2	48.8	19.5	28.2	3.5		2980
Borrow Soil #3	74.5	9.8	12.6	3.1		725

ASTM Particle Size Distribution

U.S. Sieve No.	20	40	60	100	200	270
Diameter (mm)	0.850	0.425	0.250	0.150	0.075	0.005
Sample ID	Percent Retained on Sieve					
Borrow Soil #1	3.0	9.7	15.3	17.4	19.7	6.3
Borrow Soil #2	0.5	1.3	4.1	11.3	22.7	9.0
Borrow Soil #3	1.3	7.1	13.8	23.0	23.4	5.9

Reviewed By: CRD
Title:



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6 Graham Road College Station, TX 77845
Phone: 409-690-0051 FAX: 409-690-7310

El Paso Natural Gas
Sid Johnson
Date: 11/28/89
Facility: San Juan River Project
Account No.: 63715
Lab ID: 8910015

Capillary Rise Study

Sample ID	Bulk Density gm/cm3			
Borrow Soil #1	1.24			
Borrow Soil #3	1.28			

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El Paso Natural Gas
San Juan River Project
Attn: Sid Johnson

Account No.: 63715
Lab I.D.: 8910015

Date: 10/31/89

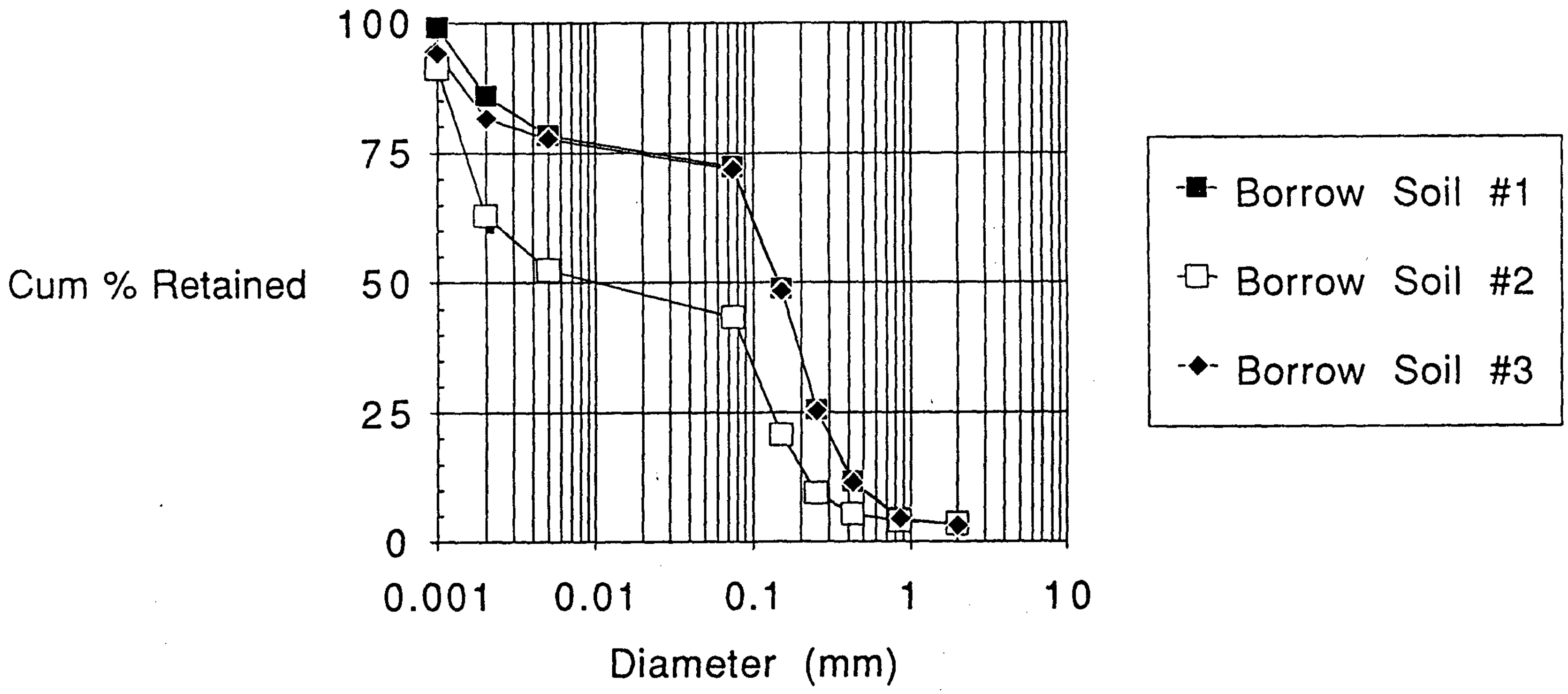
Soil Mechanical Analysis

	Texture			Soil Reaction		
	Sand	Silt	Clay	Gravel		
USDA (mm)	.05 - 2.00	.002 to .05	<.002	2.00	pH	EC
U.S. Sieve (mesh)	270 to 10			10		
Sample ID	Percent Retained on Sieve					umhos/cm
Borrow Soil #1	71.4	12.3	13.2	2.0		868
Borrow Soil #2	48.8	19.5	28.2	3.5		2980
Borrow Soil #3	74.5	9.8	12.6	3.1		725

ASTM Particle Size Distribution

U.S. Sieve No.	20	40	60	100	200	270
Diameter (mm)	0.850	0.425	0.250	0.150	0.075	0.005
Sample ID	Percent Retained on Sieve					
Borrow Soil #1	3.0	9.7	15.3	17.4	19.7	6.3
Borrow Soil #2	0.5	1.3	4.1	11.3	22.7	9.0
Borrow Soil #3	1.3	7.1	13.8	23.0	23.4	5.9

Reviewed By: CRD
Title:



EPNG San Juan River Project

K. W. Brown & Associates, Inc.
Analytical Services
6 Graham Road College Station, TX 77845
Phone: 409-690-0051 FAX: 409-690-7310

El Paso Natural Gas
Sid Johnson
Date: 11/28/89
Facility: San Juan River Project
Account No.: 63715
Lab ID: 8910015

Capillary Rise Study

Sample ID	Container Wt. gms	Soil + Container gms	Height cm	Diameter cm	Bulk Density gm/cm3
Borrow Soil #1	711.13	4155	60.96	7.62	1.24
Borrow Soil #3	618.44	4169	60.96	7.62	1.28

El Paso
Natural Gas Company

P. O. BOX 1492
EL PASO, TEXAS 79978
PHONE: 915-541-2600

OIL CONSERVATION DIVISION
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'91 MAY 6 AM 9 24

May 2, 1991

David G. Boyer, Hydrogeologist
Environmental Bureau Chief
Oil Conservation Division
Energy, Minerals & Natural Resources Dept.
State of New Mexico
Post Office Box 2088
State Land Office Bldg.
Santa Fe, New Mexico 87504

Re: San Juan River Plant Pond Closure Plan

Dear Mr. Boyer:

Enclosed please find two copies of our plan for closure of the flare pits and wastewater impoundments at San Juan River Plant in portions of Section 1, T-29-N, R-15-W and Section 36, T-30-N, R-15-W, San Juan County, New Mexico.

As you know, this is the culmination of a long series of studies. The objective has evolved from discharge of wastewater to the development of a method of closure to prevent leached salts from entering the San Juan River watershed. We believe the extent of these previous investigations have provided us with much more information than would ordinarily have been the case. We have been able to draw upon that knowledge to put together a plan that is exceptionally well-founded.

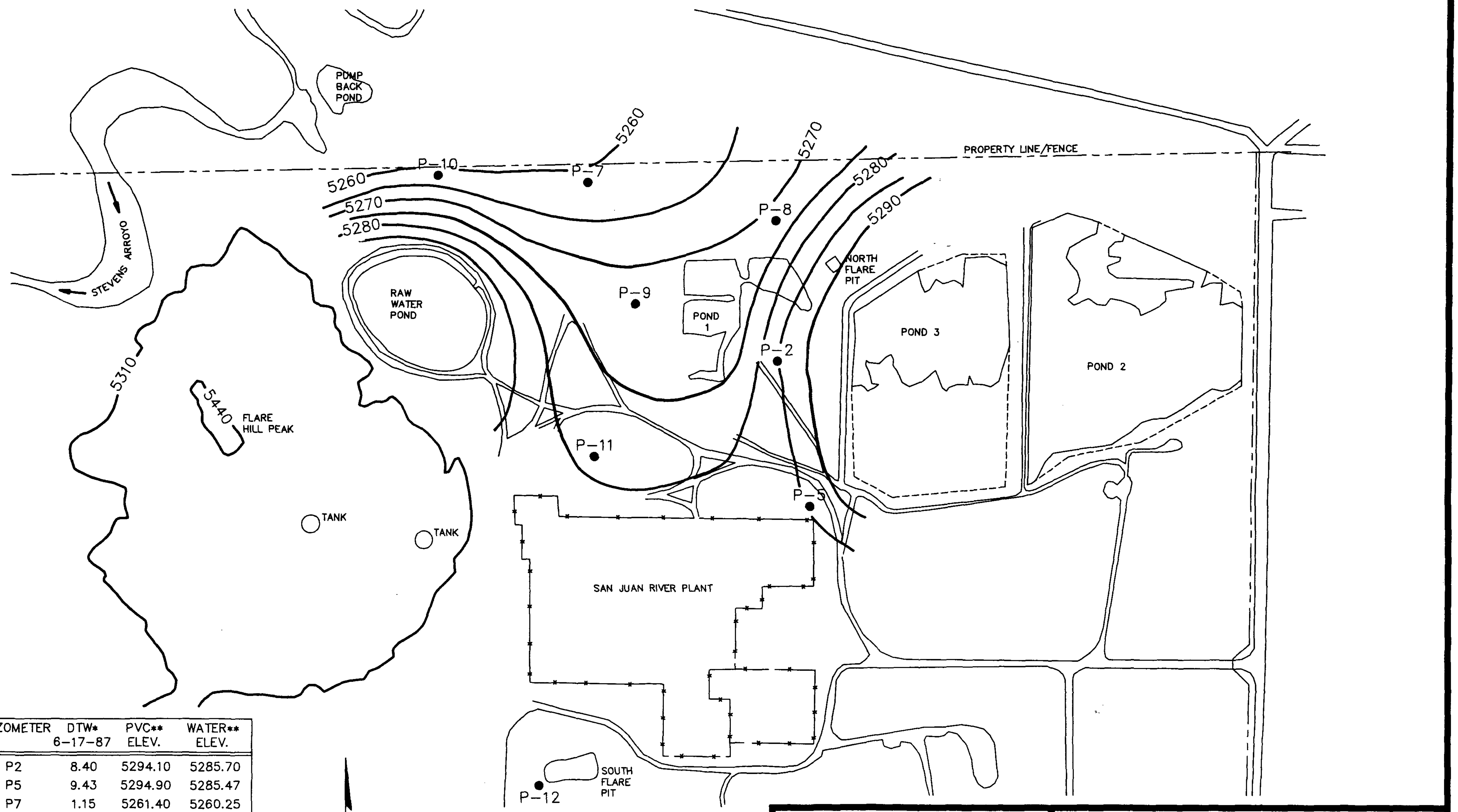
We have endeavored to include as much pertinent data as necessary in the closure plan to explain and justify the measures proposed. In order to expedite the process, we have been monitoring groundwater levels since last fall and have conducted sludge and soil sampling in accordance with the guidelines presented in the plan. We have scheduled further geotechnical testing and other measures aimed at implementing the plan as soon as possible. We hope to complete the soil work associated with the closure by the end of the summer.

If you have any questions or would like to schedule a meeting to discuss this plan, please call me any time at (915) 541-3531. Please be assured that we have every intention of continuing our long record of cooperation with the Division to achieve our mutual goals.

Sincerely,

Thomas D. Hutchins

Thomas D. Hutchins, Manager
North Region Compliance Engineering



PIEZOMETER	DTW* 6-17-87	PVC** ELEV.	WATER** ELEV.
P2	8.40	5294.10	5285.70
P5	9.43	5294.90	5285.47
P7	1.15	5261.40	5260.25
P8	8.20	5278.80	5270.60
P9	5.25	5278.00	5272.75
P10	3.70	5260.40	5256.70
P11	14.18	5292.50	5278.32
P12	22.65	5286.50	5263.85

* Depth to water from top of PVC casing in feet.
** Elevations in feet above mean sea level.

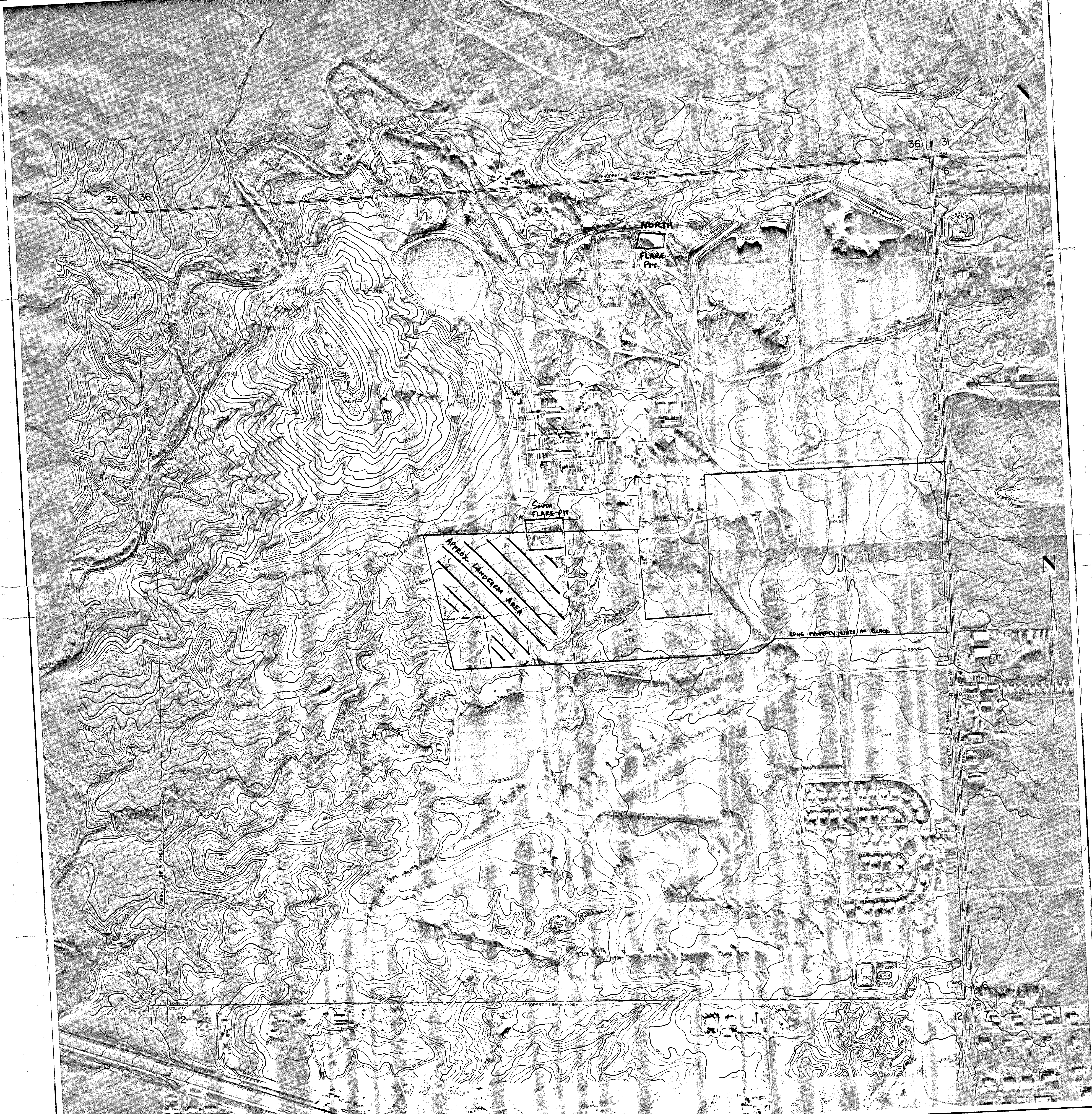
El Paso Natural Gas Company

Groundwater contours at the wastewater ponds. 6/17/87

PROJECT: 637089001-125 (EPNG-SJ2) LOCATION: SAN JUAN, NM

K.W. BROWN & ASSOCIATES, INC.

APPR:	DRAWN BY: RMM	DATE: 07-10-91	SCALE: 1"=400'
DATE: 7-10-91	DATE: 07-10-91	FIGURE: 3	



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El Paso Natural Gas Company
PIPELINE SERVICES DIVISION

SAN JUAN RIVER PLANT

SEC. 1, TWS. 29-N, RANGE 15-W
SAN JUAN COUNTY, NEW MEXICO

DWG. NO.

SHEET 2
OF 2

SITE INVESTIGATION REPORT
KIRTLAND LANDFILL SITE
SAN JUAN COUNTY

Prepared for
The United States Department of Interior
Bureau of Land Management

BLM Contract Number AA852-CT-4

Prepared by
Roy F. Weston, Inc.

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SECTION 1
SUMMARY

A site investigation was conducted at the 40 acre Kirtland Landfill located approximately 13 miles west of the city of Farmington in San Juan County, New Mexico. A sampling program was conducted that included surface sampling, subsurface soil borings, and a soil gas study. Site conditions were observed and documented, existing regulations governing contamination of soils and groundwater were reviewed, an EPA site inspection report (form 2070-13) was completed, and the EPA Hazard Ranking System was applied to the site.

1.1 DEGREE OF RISK TO HUMAN HEALTH AND THE ENVIRONMENT

The Kirtland site investigation identified and characterized potential hazards at the site that pose the most significant threats to the health of the public and the environment. Approximately 3,300 cubic yards of waste that contain volatile and semi-volatile organic compounds are located in ~~the inactive septic waste pit.~~ Compounds detected included acetone (110 ug/Kg), ~~1,1,1-trichlorethene (530 ug/Kg)~~, ~~toluene (690 ug/Kg)~~, and bis(2-ethylhexyl)phthalate (1000 ug/Kg). An estimated 32,500 cubic yards of waste material that contain volatile semi-volatile organic and inorganic compounds may exist in the dump pit. Analysis of samples collected from subsurface sampling activities detected 1,300 ug/Kg of toluene, 250 ug/Kg of methylene chloride, 1,200 ug/Kg of bis(2-ethylhexyl)phalate, arsenic (8,470 ug/Kg) and selenium (2,060 ug/Kg).

Extensive migration of waste from the ~~inactive septic waste~~ pits has not been detected, however, ~~chemical compounds have migrated vertically and horizontally. Toluene (690 ug/Kg), 1,1,1- trichloroethane (32 ug/Kg), and bis(2-ethylhexyl)phthalate (520 ug/Kg) were detected forty feet below surface grade. Available hydrogeologic information indicates that a shallow aquifer (at a depth of approximately 70 feet below the surface) possibly underlays the site.~~ Groundwater was not encountered during subsurface sampling activities and clay materials were identified that did not completely restrict the vertical/horizontal migration of chemical compounds. Review of USGS data did not identify any domestic water wells downgradient of the site within a distance of 2 miles from the site.

The degree of human health and environmental risks posed by the Kirtland site can be defined by comparing the sampling results to standards that do exist, along with a consideration of the mobility of the waste, site accessibility and adjacent land use. The state of New Mexico has not implemented specific regulations or guidelines for "action levels" of organic contaminates in soils against which the levels of contamination found on site can be compared. However, the state has Human Health Standards for Groundwater that apply to several compounds detected at the site. Compounds such such as toluene, methylene chloride and 1,1,1-trichloroethane were detected in several samples exceeding the New Mexico standards. Arsenic and selenium were detected above EP toxicity limitations. These compounds present the potential for discharging to a shallow aquifer below the site at levels above New Mexico standards.

A shallow aquifer potentially exists below the site. However, due to the buffer distance of 2.5 miles to the nearest domestic downgradient water well, the low chemical compound concentrations and the low annual precipitation (8 inches) in the region, it does not appear that a major threat to human health or the environment is posed by the Kirtland site.

The site has been classified as Level III and has been given an HRS score of 6.30. This classification and score reflect the following:

1. A significant volume of waste is present (35,000 cubic yards).

2. The site is located in a remote area. Land surrounding the property to the north, west and east are primarily undeveloped. Migration of chemical compounds via surface water is deemed insignificant due the low annual precipitation and lack of surface waters in the immediate area.

3. Vertical migration of chemical compounds from the waste material has occurred. Compound concentrations were detected at less that one mg/Kg at a 40 foot depth.

4. Available hydrogeologic information indicates that a shallow aquifer possibly underlays the site. Compounds detected in the waste present the potential for discharging to a shallow aquifer, above New Mexico Human Health Standards for Groundwater.

5. No domestic water wells were identified downgradient at the site within a 2 mile distance from the site.

1.2 RESPONSIBLE PARTIES AND OFF SITE CONTRIBUTORS

The Kirtland Landfill property has been leased by BLM to the San Juan County Road Department since May 21, 1962 for use as a modified landfill. No potential off site contributors that may have disposed of hazardous substances in the waste pits have been identified.

1.3 RECOMMENDED ACTIONS

The results of the Kirtland Landfill site investigation indicate that the inactive septic and dump pits contain several organic compounds in the disposed wastes. Several of these compounds have migrated vertically downward and were detected as deep as 40 feet.

Based on the site investigation results and available information the potential exists for migration of chemical constituents to a shallow aquifer. Therefore, WESTON recommends the following activities be initiated:

- Restrict access to and contain both the inactive septic and dump pit; and
- Conduct a subsurface investigation to define the local aquifer and potential for its contamination.

SECTION 2
SITE BACKGROUND INFORMATION

2.1 LOCATION

The Kirtland Landfill site is near the city of Kirtland, approximately 13 miles west of Farmington, San Juan County, New Mexico. It is located on the USGS Youngs Lake, New Mexico, 7.5 minute quadrangle map at 36°46'00' N latitude 108°21'15" W longitude. Consisting of about 40 acres in T30N, R14W, Lot 4, Section 31, the site is located about 0.3 miles northeast of the El Paso Natural Gas Company (EPNG), San Juan River Plant, a refinery, about 0.2 mile from the intersection of San Juan County Routes 6500 and 6480 (Figure 2-1). The landfill operation extends to the southern portion of the site between two powerlines (115kv powerline) owned and operated by the Public Service Company of New Mexico, Farmington, New Mexico. The site is under the jurisdiction of the Farmington Resource Area (FRA), Albuquerque District, BLM New Mexico State Office, Santa Fe, New Mexico.

2.2 SITE DESCRIPTION

The site is an active modified sanitary landfill leased by the BLM to San Juan County since May 1962. The site covers an area of approximately 40 acres (generally square in shape with the sides measuring approximately 1,300 feet) and has been partially modified from time to time as a result of the landfill operations. The site is located in a gently sloping area along Stevens Arroyo at an approximate elevation of 5,300 feet above mean sea level. The region has an arid climate and receives an average annual precipitation of about 8 inches. The average annual air temperature is about 53 degrees Fahrenheit and the average frost-free period is about 150 days. The native vegetation is primarily grass (i.e. Indian rice grass, winterfat, and big sagebrush).

2.3 SITE LAYOUT

The entire site is fenced. The site entrance contains a lockable gate that is located on the southwest portion of the site and is equipped with warning signs. The inactive septic waste pit located along the western portion of the site and the dump pit located along the northern portion of the site are both enclosed by individual chain-link fences. A San Juan County officer resides on the site during operation hours. The layout of the site is shown in Figure 2-2. At the time the site investigation (SI) was conducted,

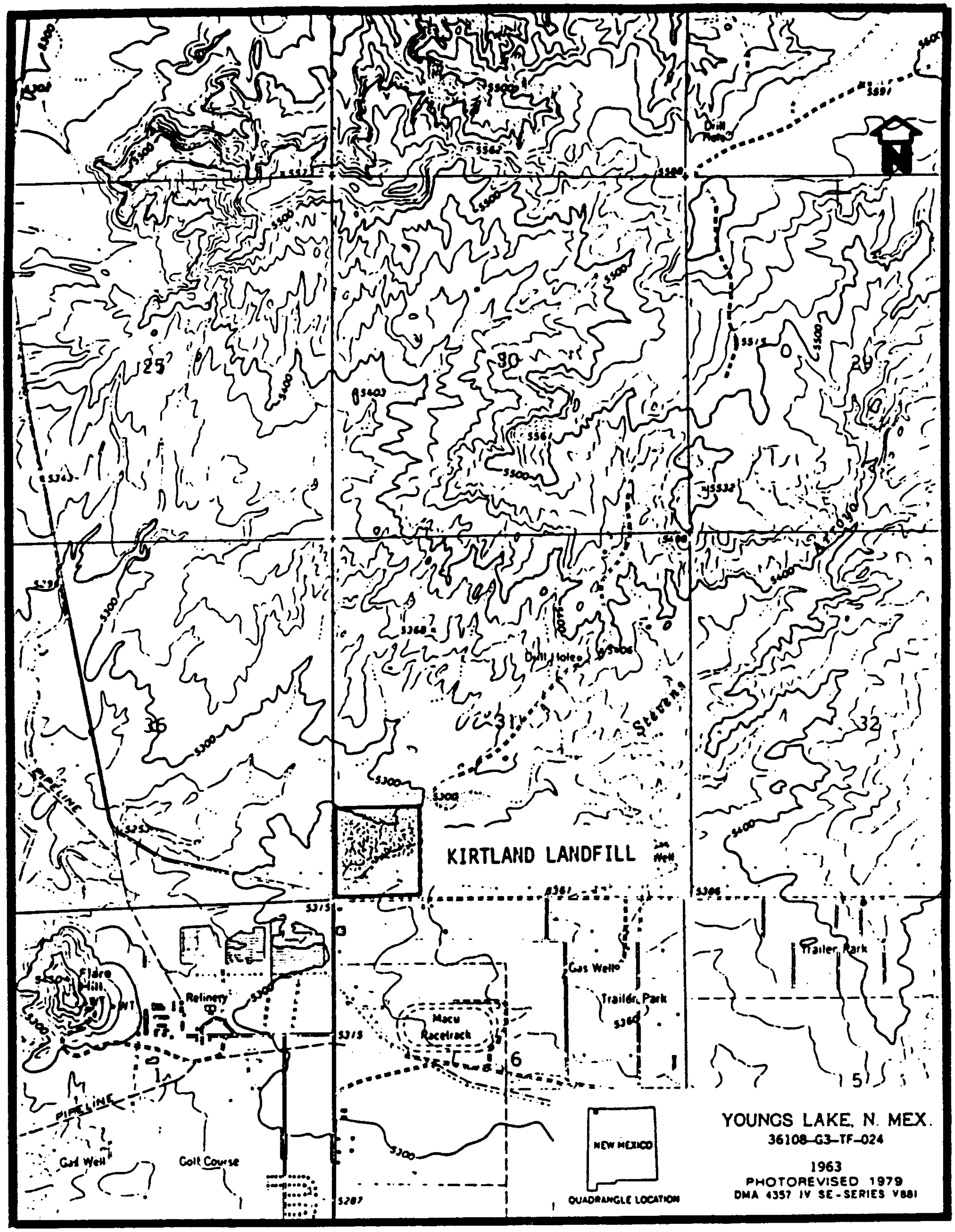

FIGURE 2-1 KIRTLAND LANDFILL SITE LOCATION MAP

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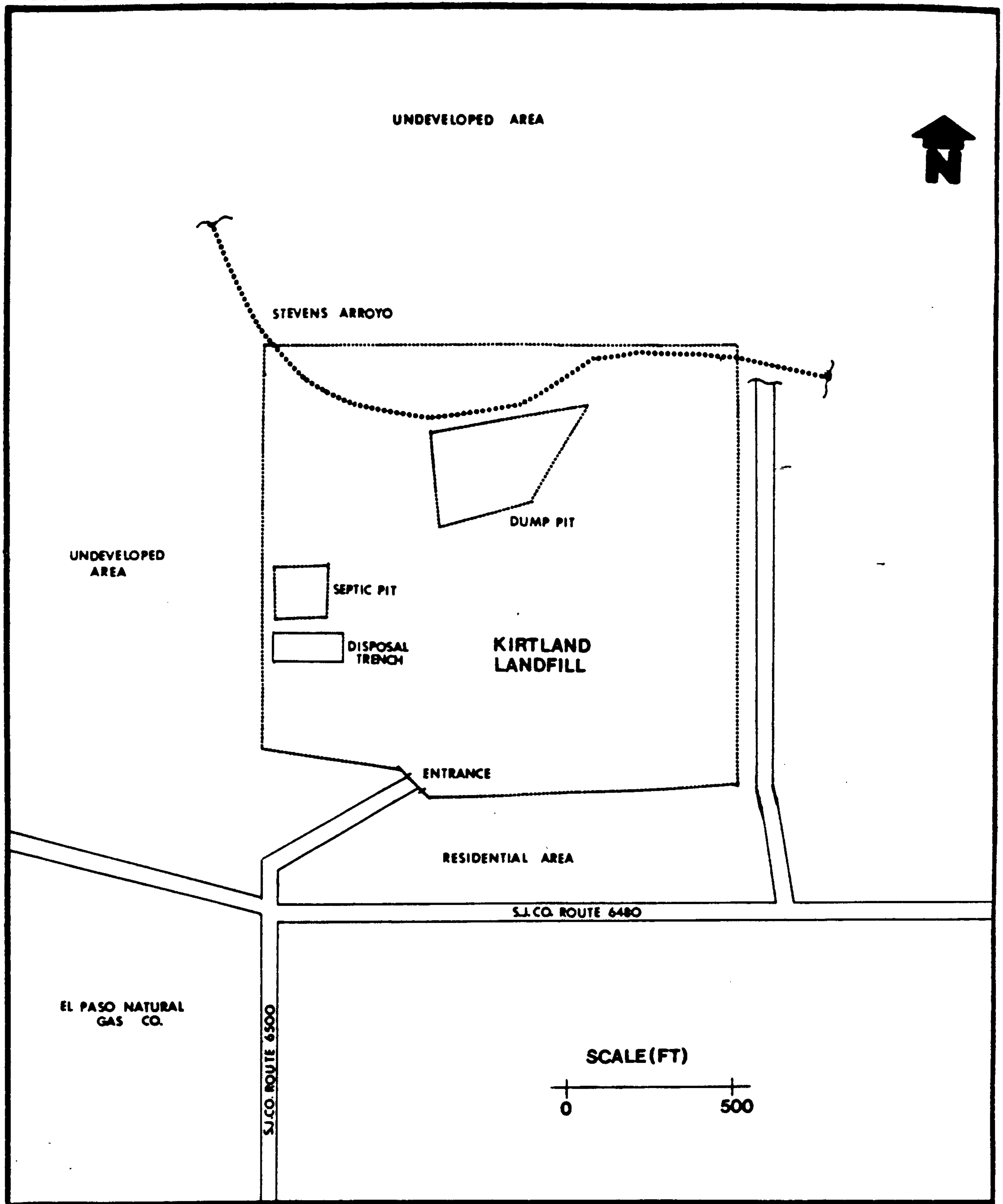

FIGURE 2-2 SITE LAYOUT

ROY F. WESTON, INC.
WESTON
ENVIRONMENTAL CONSULTANTS-DESIGNERS

DRAWN R. MUELLER	DATE 1/30/88	DES. ENG.	DATE	W. O. NO.
CHECKED		APPROVED		DWG. NO.

the inactive septic waste pit that had been sampled during the preliminary assessment (PA) was closed and bermed with native soils and consisted of a mound approximately 4 to 6 feet above grade.

SECTION 3
SCOPE OF EVALUATION AND ANALYTICAL EFFORT

3.1 BACKGROUND DATA ACQUISITION

Available background data was obtained from the U. S. Department of the Interior Bureau of Land Management (BLM), State of New Mexico Environmental Improvement Division (EID), U.S. Department of Agriculture Soil Conservation Service (SCS) and the U.S. Geological Survey (USGS). Materials obtained included:

- Site maps and facility sketches;
- Preliminary Assessment (PA) Report conducted by AEPCO, Inc. - August 1986;
- BLM Recreation or Public Purposes lease agreements and operational compliance inspection reports;
- New Mexico EID solid waste facility inspection reports;
- SCS Soil Survey of San Juan County, New Mexico, Eastern Part; and
- USGS Hydrologic Data for the San Juan and Animas River Valleys in the Farmington, Aztec, Bloomfield, and Cedar Hill Areas, San Juan County, New Mexico.

3.2 ENVIRONMENTAL MONITORING AND SAMPLING PROGRAM

The objective of the site monitoring and sampling program was to observe and document on-site conditions and to safely and representatively sample all potentially hazardous materials. Efforts were directed at obtaining information that could be used to develop plans for possible remedial actions, and to assist in cost recovery from potentially responsible parties.

Initially, an off-site reconnaissance survey was conducted around the perimeter and in the general vicinity of the site. The general layout of the site was observed and mapped. No evidence for off-site migration of contaminants, or hazardous conditions were noted.

Available background information on the Kirtland Landfill indicated that petroleum industrial wastes and other hazardous wastes had been disposed of in the landfill inactive septic pit. Compounds identified in the inactive septic pit and inactive dump pit during PA activities included metallic, volatile and semi-volatile compounds. Based on this information, sampling activities for the site investigation study focused on the site receptors and drainage pathways. Sampling activities included surface samples, subsurface soil borings, and a soil gas study.

3.2.1 Surface Sampling

Surface waste samples from the inactive septic pit (Sample No. KLF-SP) and the dump pit (Sample No. KLF-WOL) were collected with a stainless steel trowel and placed directly into eight ounce laboratory cleaned jars with teflon-lined lids. The sample from the inactive septic pit consisted primarily of inactive septic sludge waste while the samples from the dump pit consisted of a dark stained soil. Samples were stored on ice in coolers. United States EPA chain-of-custody procedures were followed.

3.2.2 Subsurface Soil Sampling

Two soil borings to 30-35 foot depths were conducted at the inactive septic waste pit and two soil borings to 20 and 30 foot depths were conducted at the dump pit. Figures 3-1 and 3-2 present the location of the soil borings. Samples were obtained from a hollow-stem auger soil borings by means of a 4-inch (ID) split spoon continuous sampler using brass sleeves for soil retention. At the time of collection samples were qualitatively screened for chemical constituents using a photoionization detector (PID) and/or organic vapor analyzer (OVA) and visually classified. Soil boring logs are included in Appendix A.

Boring B1 was located at southern corner of the inactive septic pit inside the chain-link fence at the rim of the pit soil berm. Boring B1 was drilled at a 25 degree angle to a vertical depth of 30.4 feet to intersect below the pit. Samples were collected at 5, 10, 20, and 30 foot intervals. Soil consisted primarily of slightly silty fine-grained sand to an approximate depth of 12.2 feet with silt and clay continuing to a depth of 19.9 feet. An olive clay was encountered to a total depth of 30.4 feet.

Boring B2 was located on the north end of the inactive septic waste pit adjacent to the chain-link fence. Boring B2 was drilled at 25 degree angle to a vertical depth of 34.9 feet to intersect below the pit. Samples were

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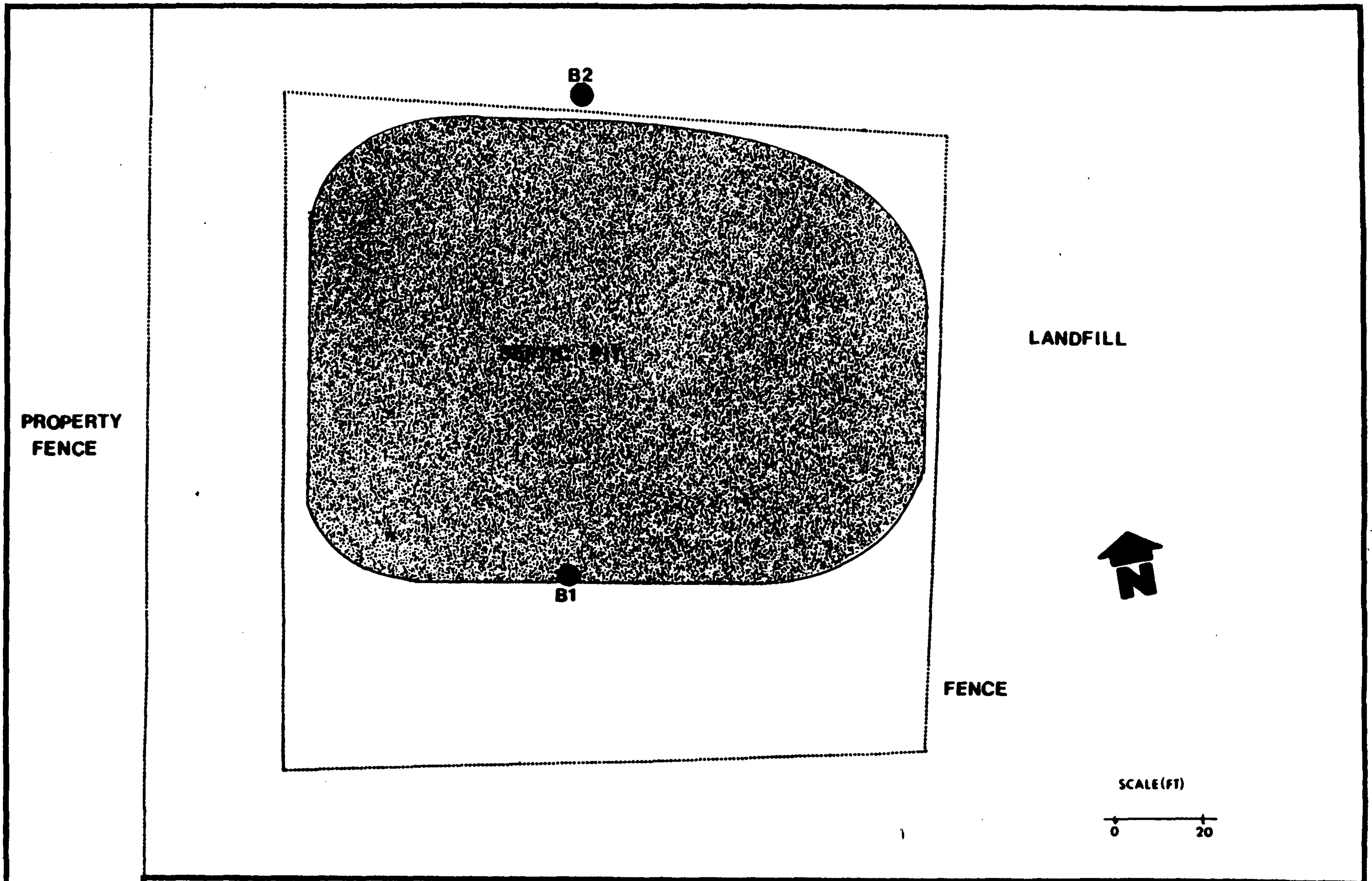

LEGEND

● SOIL BORINGS

FIGURE 3-1 SEPTIC PIT SAMPLE LOCATIONS

ROY F. WESTON, INC.
WESTON
ENVIRONMENTAL CONSULTANTS-DESIGNERS

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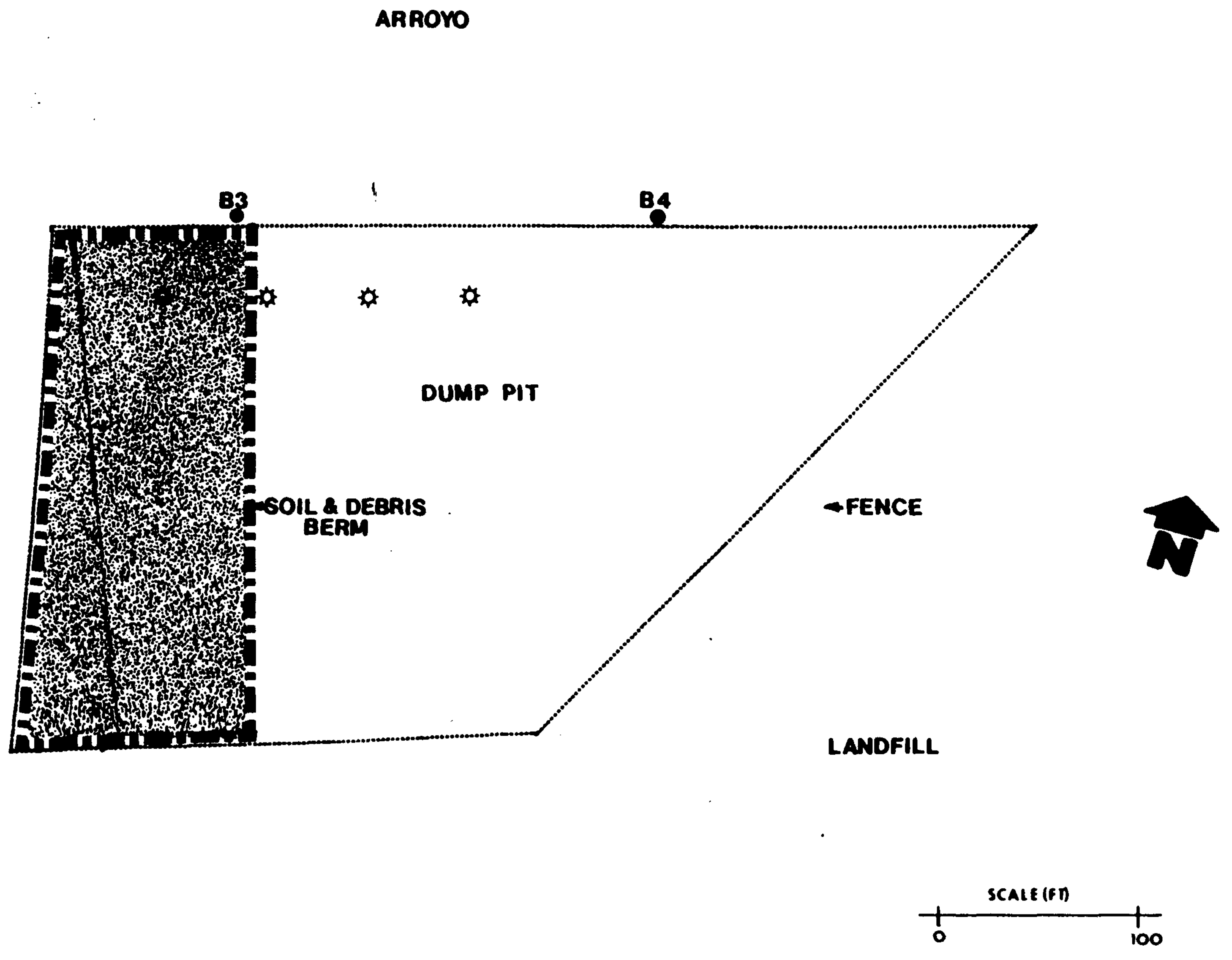

LEGEND
☼ SOIL GAS PROBES
● SOIL BORINGS

FIGURE 3-2 DUMP PIT SAMPLE LOCATIONS

ROY F. WESTON, INC.
WESTON
ENVIRONMENTAL CONSULTANTS-DESIGNERS

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DES. ENG.
DATE
W. O. NO.
CHECKED
APPROVED
DWG. NO.

collected at 5, 10, 15, 20, 25, 30 and 35 foot intervals. Soil consisted primarily of fine sands with silt layers to an approximate depth of 13.6 feet. An olive clay continued to the total depth of 34.9 feet.

Boring B3 was located at the west side of the north end of the dump pit adjacent to the chain-link fence. Boring B3 was drilled at a 25 degree angle to a vertical depth of 31.7 feet. Samples were collected at 5, 10, 20 and 30 foot intervals. Soils consisted primarily of silty sand to an approximate depth of 18.1 feet with olive claystone continuing to the total depth of 31.7 feet.

Boring B4 was located at the east side of the north end of the dump pit adjacent to the chain-link fence. Boring B4 was drilled vertically to a depth of 20 feet. Samples were collected at 5, 10 and 20 foot depths. Soils consisted primarily of silt and clay with a low percentage of sand to an approximate depth of 10 feet with olive claystone continuing to a total depth of 20 feet.

3.2.3 Soil Gas Survey

A soil gas survey was conducted the first week of January 1988. The survey was to focus on areas surrounding known or suspected sources of disposed hazardous substances such as the dump pit. Soil gas probe locations are shown in Figure 3-2. Probe holes were installed to a depth of approximately 4 feet using a 1/2-inch diameter slam-bar. One quarter-inch diameter copper probes with a teflon inner tubing were placed in each hole. Soil gas samples were obtained using an air sampling pump at a purge rate of 200 milliliters per minute run for a 5 minute purge time. Samples were collected in 250 milliliter glass bulbs.

Severe weather conditions that included one foot of snow on the ground and temperatures as low as 5 degrees Fahrenheit were encountered. The top 1 to 1 1/2 feet of soil below the snow was frozen. Modifications in the sampling routine were initiated to reduce probe time in the ground and, therefore, reducing chances of temperatures decreasing in the probe holes and corresponding condensation of volatiles, and air flow restriction.

3.3 SAMPLING RESULTS

Based on Preliminary Assessment results (AEPCO, 1986) surface and subsurface samples were analyzed for volatile organic compounds (EPA method 8240), semi-volatile organic compounds (EPA method 8270), and toxic metals (EP toxicity method). In addition, the inactive septic pit and dump pit surface samples (KLF-SP and KLF-WOL) were analyzed for corrosivity and ignitability. Results of the Kirtland Landfill Site Investigation sampling program are summarized in Table 3-1. No organic compounds were detected in the laboratory blank. Alliquots of soil samples from various depths of the same boreholes were composited on an equal volume basis prior to analyses. Analytical laboratory results are included in Appendix B.

3.3.1 Surface Sampling Results

Two volatile organic compounds, acetone and toluene, were detected in the inactive inactive septic pit (KLF-SP) at concentrations of 110 and 470 micrograms per kilogram (ug/Kg) respectively. Barium and mercury were detected at concentrations below EP toxicity limitations. No semi-volatile organic compounds were detected and the sample did not contain corrosivity or ignitability characteristics.

Acetone and toluene were detected at 63 ug/Kg and 1,300 ug/Kg respectively in the dump pit (KLF-WOL). Barium was detected at a concentration below EP toxicity limitations. No semi-volatile organic compounds were detected and the sample did not contain corrosivity or ignitability characteristics.

3.3.2 Subsurface Sampling Results

Samples from boring B1, which was located at the south edge of the inactive inactive septic waste detected 1,1,1 trichloroethane, toluene, and bis(2-ethylhexyl)phthalate at various depths. Figure 3-3 presents a cross section of Soil Boring B1 and compounds identified. Bis(2-ethylhexyl) phthalate was detected at 550 ug/Kg in the 20 and 30 foot composite sample, while 1,1,1 trichloethane and toluene were only detected 62 and 60 ug/Kg, respectively, at the 30 foot interval. Mercury was detected in boring B1 but at concentrations below EP toxicity levels.

Samples from boring B2, located at the north fenceline of the inactive inactive septic waste pit, detected acetone, 1,1,1 trichloroethane, toluene and bis(2-ethylhexyl) phthalate at various depths. Figure 3-3 presents a cross section of Boring B2 and compounds identified. Bis(2-ethylhexyl)- phthalate was detected at 1200 ug/Kg in the 20 and 30 foot composite sample, while toluene was detected at 690 ug/Kg at the 40 foot interval. Mercury was detected in boring B2 but at concentrations below EP toxicity levels.

Results of soil samples collected from borings B3 and B4 at the dump pit detected methylene chloride, 1,1,1 trichloro-

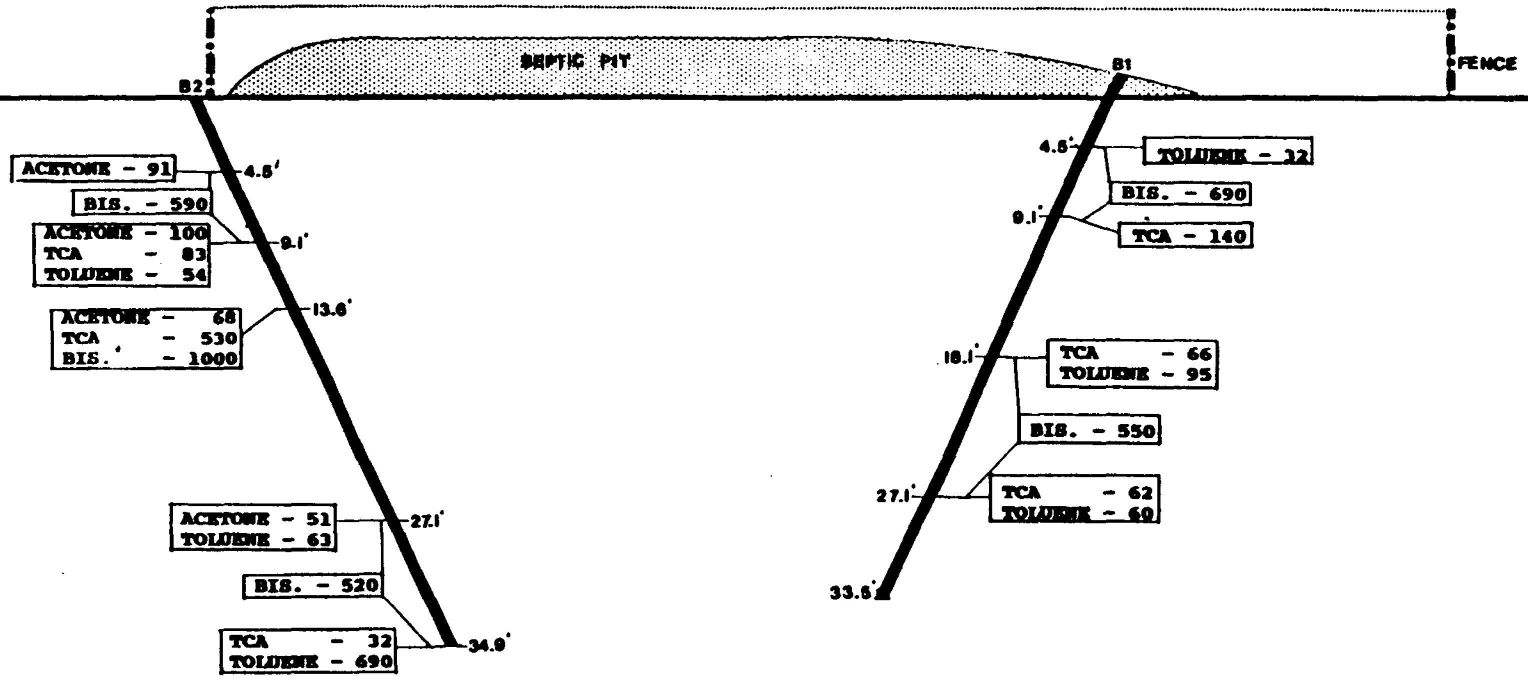
TABLE 3-1

SUMMARY OF ANALYTICAL RESULTS

Kirtland Land Fill
Concentration (ug/Kg)

Volatile Organic Compounds	BLANK	KLF-B1-5	KLF-B1-10	KLF-B1-20	KLF-B1-30	KLF-B2-5	KLF-B2-10	KLF-B2-15	KLF-B2-30	KLF-B2-40	KLF-B3-5	KLF-B3-10	KLF-B3-20	KLF-B3-30	KLF-B4-5	KLF-B4-11	KLF-B4-20	KLF-SP	KLF-WOL
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	250	34	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	91	100	68	51	ND	ND	ND	ND	ND	ND	ND	ND	110	63
1,1,1-Trichloroethane	ND	ND	140	66	62	ND	83	530	ND	32	32	42	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	32	ND	95	60	ND	54	ND	63	690	180	280	30	580	110	610	110	470	1300

Semi Volatile Organic Compounds		KLF-B1-5,10	KLF-B1-20,30	KLF-B2-5,10	KLF-B2-15	KLF-B2-30,40	KLF-B3-5,10	KLF-B3-20,30		KLF-B4-5,11	KLF-B4-20	KLF-SP	KLF-WOL
bis(2-Ethylhexyl)Phthalate	ND	690	550	590	1000	520	ND	1200		ND	390	ND	ND
Metals													
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND		ND	8470	ND	ND
Barium	ND	ND	ND	ND	ND	ND	ND	ND		270	1810	290	230
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND		ND	118	ND	ND
Chromium	ND	ND	ND	ND	ND	ND	ND	ND		ND	309	ND	ND
Lead	ND	ND	ND	ND	ND	ND	ND	ND		ND	2000	ND	ND
Mercury	ND	1.0	0.9	1.0	0.7	4.7	9.7	1.5		2.8	0.3	0.2	ND
Selenium	ND	ND	ND	ND	ND	ND	ND	ND		ND	2060	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND
Other Parameters													
Corrosivity, pH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.42	7.78
Ignitability, degrees F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	>230	>230



LEGEND

TCA - Trichloroethane
BIS - Bis(2-ethylhexyl)phthalate

All concentrations are in
micrograms per kilogram (ug/kg)

View is from north to south

Vertical Scale - 1 inch equals 8 feet
Horizontal Scale - 1 inch equals 16 feet

FIGURE 3-3 SEPTIC PIT AT CROSS-SECTION OF SOIL BORINGS

ROY F. WESTON, INC.
WESTON
DESIGNERS CONSULTANTS

DRAWN	DATE	DES. ENG.	DATE	W. O. NO.
B. MUELLER	2/1/88			
CHECKED		APPROVED		DWG. NO.

ethane, toluene and bis(2-ethylhexyl)phthalate at various depths. Figure 3-4 shows a cross section of Boring B3 and B4 and compounds identified. The highest concentration of compounds detected in boring B3 were methylene chloride (250 ug/Kg), and toluene (580 ug/Kg) at the 30 foot interval and bis(2-ethylhexyl)- phthalate (1200 ug/Kg) in the 20 and 30 foot composite sample. Mercury was detected in boring B3 but at concentrations below EP toxicity levels.

Methylene chloride, toluene and bis(2-ethylhexyl)phthalate were detected in boring B4. Toluene was detected in all three samples with the highest concentration of 610 ug/Kg detected at the 11 foot interval. Methylene chloride was detected at only 34 ug/l in the 5 foot interval and bis-(2-ethylhexyl)phthalate at 390 ug/l in the 20 foot interval. Several inorganic compounds were detected in boring B4. However, only arsenic and selenium were detected above EP toxicity levels at 8.47 mg/l and 2.06 mg/l, respectively.

3.3.3 Soil Gas Results

Analysis of soil gas samples obtained were not within the detection range of the field equipment, except in the area directly above the waste pit. More sensitive equipment was ordered and installed. However, despite the additional equipment valid results from new samples were unobtainable. The soil gas assessment was not able to provide any additional information concerning migration of contaminants on the site.

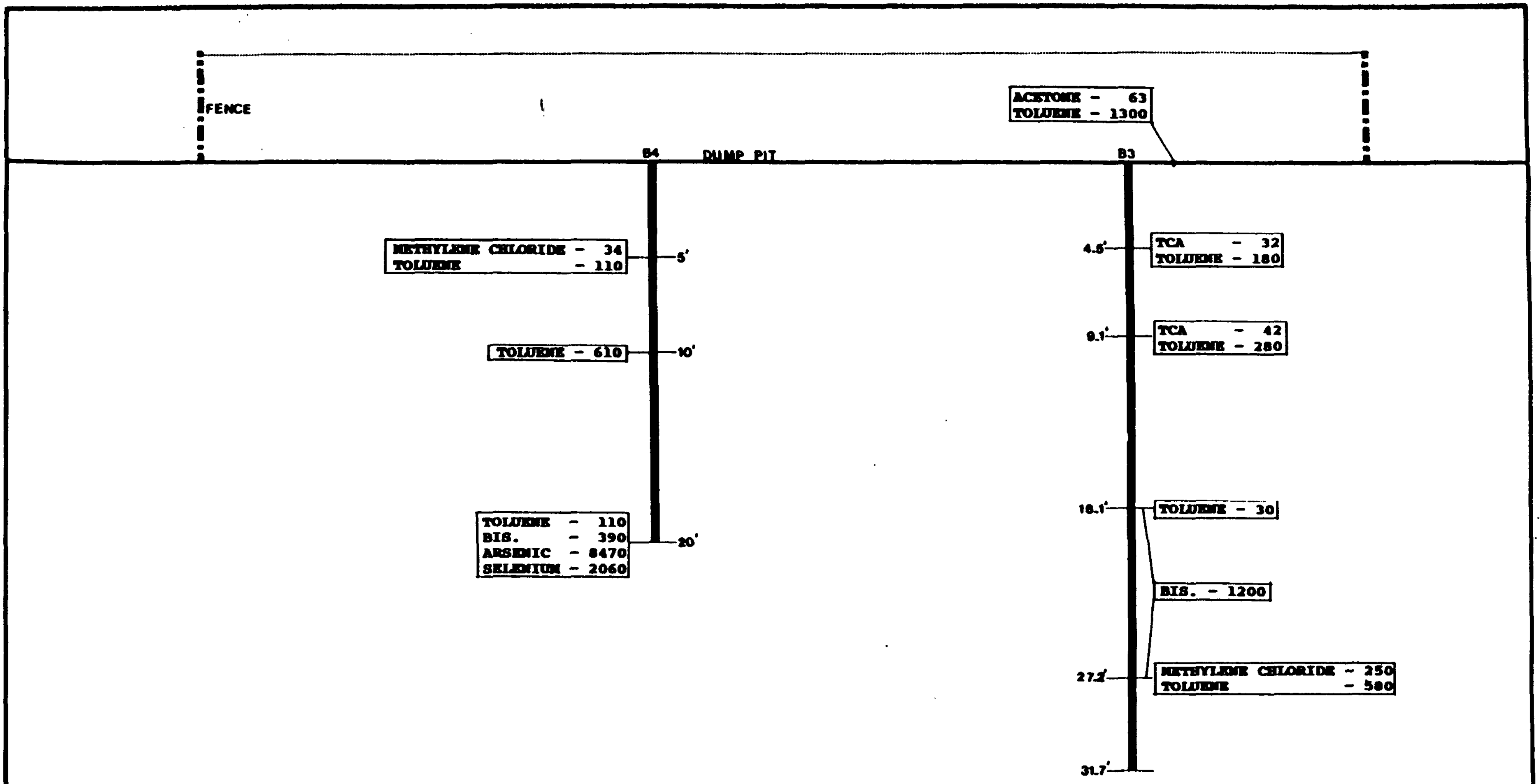
3.4 QUALITY ASSURANCE PROCEDURES

To assure that quality data were obtained, care was taken to avoid contamination of samples and cross contamination between samples. A dedicated effort was made to ensure representative samples were collected. Specifically, this involved using clean sampling equipment to begin with and decontaminating equipment between holes, careful sample andling, appropriate sample preservation, and stringent aboratory requirements.

o split spoon continuous samplers were utilized during the bsurface sampling operations. Samplers were ontaminated after each use by a four step process:

- Trisodium phosphate wash;
- Tap water rinse;
- Distilled water rinse; and
- Allowing the sampler to air dry.

flights were steam cleaned between holes.



LEGEND

TCA - Trichloroethane
BIS - Bis(2-ethylhexyl)phthalate

All concentrations are in
micrograms per kilogram (ug/kg)

View is from east to west

Vertical Scale - 1 inch equals 8 feet
Horizontal Scale - 1 inch equals 10 feet

FIGURE 3-4 DUMP PIT AT CROSS-SECTION OF SOIL BORINGS

ROY F. WESTON, INC.
WESTON
DESIGNERS CONSULTANTS

DRAWN R MUELLER	DATE 2/1/88	DES. ENG.	DATE	W. O. NO.
CHECKED		APPROVED		DWG. NO.

Stainless steel trowels were used for sampling waste material to avoid cross-contaminating the samples. Composited of soil samples was performed in the laboratory. Aliquots of soil samples from the same boreholes were composited on a equal volume bases prior to analyses. Pertinent sample information was recorded in the site logbook and sample data sheets in the field. Soil samples were individually bagged, kept on ice, and shipped for delivery overnight to the laboratory. Sample labels were completed at the site and appropriate chain of custody procedures were followed for all samples. Chain of custody sheets are included in Appendix C.

3.5 SITE AREA RECONNAISSANCE

The Kirtland site and vicinity was thoroughly traversed during the site investigation. No evidence of hazards were encountered, that might pose an immediate or long term threat to the public or environment, that were not already addressed in the sampling operations.

SECTION 4
WASTE TYPES AND QUANTITY

4.1 LOCATION

The inactive septic waste pit and inactive dump pit were the only two areas identified during the site investigation to warrant sampling and to contain chemical constituents. The inactive septic pit is located along the western boundry of the site and the dump pit is located along the northern portion of the site. Figure 2-2 shows the site layout and location of the pits.

The inactive septic pit is approximately 100 feet by 150 feet and has been bermed above ground with 4 to 6 feet of native soils. The dump pit is approximately 500 feet by 350 feet and slopes downward to the north, towards Stevens Arroyo. The western part of the dump pit contains a area that is bermed on the northern and western sites.

4.2 FORM AND PHYSICAL STATE OF WASTE

No records of the quantity, types of wastes disposed or the exact dates of disposal have been maintained at the facility. Waste disposed of in the inactive septic pit is comprised of a inactive septic sludge waste containing several organic compounds. Organic compounds are also contained in soils below the waste material. Waste disposed of in the dump pit is comprised of various debri, inactive septic waste and dark stained soil containing several organic compounds. Organic compounds, arsenic and selenium are also contained in soils below the waste materis. According to San Juan County personnel, the pits are unlined and no lining material was encountered during the subsurface investigation.

The five organic compounds detected in the subsurface samples were acetone, methylene chloride, 1,1,1-trichloroethane, toluene and bis(2-ethylhexyl)phthalate. Acetone, methylene chloride and toluene are primarily used as paint and varnish solvents. 1,1,1-trichloroethane is used as a metal degreaser (solvent). Toluene is also used as an aviation gasoline blending stock. Bis(2-ethylhexyl)-phthalate is a liquid used in vacuum pumps.

Arsenic and selenium were also detected in the subsurface samples. Arsenic is a nonmetallic element that is highly toxic by ingestion and inhalation and is a carcinogen. Arsenic is used as an alloying additive for metals especially lead and copper (shot, battery grids, cable sheaths and boiler tubes. Selenium is a nonmetallic element primarily used in electronic equipment.

4.3 QUANTITIES AND CONCENTRATIONS

The inactive septic waste pit covers an approximate area of 15,000 square feet. The exact depth of the waste material is unknown. However, fill material was encountered to an average depth of six feet in the borings of 12 feet in Boring B1 which indicates the pit contains approximately six feet or 3,300 cubic yards of waste material. Organic compounds have migrated vertically from the waste to the surrounding soils. The highest concentration of compounds was detected at Boring B2 at the 15 foot depth. Compounds detected included acetone (68 ug/Kg), 1,1,1-trichloroethane (530 ug/Kg) and bis(2-ethyl- hexyl)phthalate (1000 ug/Kg).

The depth of the 146,000 square foot dump pit is unknown. Review of the soil borings indicates that the pit fill material extends 6 feet below grade. Therefore, the pit may contain 32,500 cubic yards of waste materials. However, hazardous substances have migrated vertically and horizontally from the waste to the surrounding soils. Analysis of the waste material and soil is identified as toluene at 1300 ug/Kg and bis(2-ethylhexyl)phthalate at 1200 ug/Kg.

4.4 EXISTING REGULATIONS

The state of New Mexico has not implemented specific regulations or guidelines for "action levels" of contaminants in soils. The New Mexico Environmental Improvement Division's (EID) regulatory authority is based on the state's Water Quality Control Commission Regulations (as amended March 3, 1986). The EID follows the state's Water Quality Control (Part 3) Regulations for Discharges Onto or Below the Surface of the Ground, Section A (Human Health Standards) or EPA Drinking Water Standards, whichever is more stringent. Table 4-1 presents the State of New Mexico Human Health Standards for Groundwater. "Action Levels" for a specific site are normally negotiated in Settlement Agreements with the state. This allows for state oversight of groundwater/subsurface investigations and remediation (telephone conversation, Mr. Bruce Fredrick, EID, with Mr. Burt Hyde, WESTON, December 2, 1987.).

Acetone, 1,1,1-trichloroethane, toluene, bis(2-ethylhexyl)-phthalate and mercury were detected in samples collected at the inactive septic pit. 1,1,1-trichloroethane was the only compound that exceeded the New Mexico Groundwater Human

TABLE 4-1
NEW MEXICO GROUNDWATER HUMAN HEALTH STANDARDS

Arsenic (As)	0.1 mg/l
Barium (Ba)	1.0 mg/l
Cadmium (Cd)	0.01 mg/l
Chromium (Cr)	0.05 mg/l
Cyanide (CN)	0.2 mg/l
Fluoride (F)	1.6 mg/l
Lead (Pb)	0.05 mg/l
Total Mercury (Hg)	0.002 mg/l
Nitrate (NO_3 as N	10.0 mg/l
Selenium (Se)	0.05 mg/l
Silver (Ag)	0.05 mg/l
Uranium (U)	5.0 mg/l
Radioactivity: Combined Radium-226 and Radium-228	30.0 pCi/l
Benzene	0.01 mg/l
Polychlorinated biphenyls (PCBs)	0.001 mg/l
Toluene	0.75 mg/l
Carbon Tetrachloride	0.01 mg/l
1,2-dichloroethane (EDC)	0.01 mg/l
1,1-dichloroethylene (1,1-DCE)	0.005 mg/l
1,1,2,2-tetrachloroethylene (PCE)	0.02 mg/l
1,1,2-trichloroethylene (TCE)	0.1 mg/l
ethylbenzene	0.75 mg/l
total xylenes	0.62 mg/l
methylene chloride	0.1 mg/l
chloroform	0.1 mg/l
1,1-dichloroethane	0.025 mg/l
ethylene dibromide (EDB)	0.0001 mg/l
1,1,1-trichloroethane	0.06 mg/l
1,1,2-trichloroethane	0.01 mg/l
1,1,2,2-tetrachloroethane	0.01 mg/l
vinyl chloride	0.001 mg/l
PAHs: total naphthalene plus monomethylnaphthalenes	0.03 mg/l
benzo-a-pyrene	0.0007 mg/l
Chloride (Cl)	250.0 mg/l
Copper (Cu)	1.0 mg/l
Iron (Fe)	1.0 mg/l
Manganese (Mn)	0.2 mg/l
Phenols	0.005 mg/l
Sulfate (SO_4)	600.0 mg/l
Total Dissolved Solids (TDS)	1000.0 mg/l
Zinc (Zn)	10.0 mg/l
pH	between 6 and 9

Health Standards. However, acetone and bis(2-ethylhexyl) phthalate are not listed on the New Mexico standards.

Methylene chloride (Sample B3-30) and toluene (Sample WOL) were detected exceeding New Mexico standards. Arsenic and selenium were detected in Sample B4-20 exceeding EP toxicity limitations. Arsenic, barium, cadmium, chromium, lead and selenium in Sample B4-20 and mercury in Sample B4-5 were detected at concentrations exceeding New Mexico standards.

Compounds, exceeding concentration standards, in the inactive septic and dump pit present the potential for discharging to a shallow aquifer below the site above the New Mexico standards.

4.5 CONTAINMENT AND ACCESSIBILITY

Both the inactive septic pit and dump pit are not lined and are constructed within the native soils at the site. Wastes contained within the pits have been bermed with native soils. Both waste pits are located within the fenced landfill and are enclosed by individual chain link fences.

Various clays were encountered below the pits during the subsurface investigations. Generally, clays were encountered 15 to 20 feet below the pits and were dense olive or gray with some shaly partings beginning to develop. The soils are apparently not impermeable due to compounds detected at various depths within the clays.

SECTION 5
EFFECTS ON HUMAN HEALTH AND THE ENVIRONMENT

5.1 SITE LAND USE, DEMOGRAPHICS, AND ENVIRONMENT

The Kirtland Landfill is readily accessible; however the area is of limited use. Property south of the site is residential with the exception of the El Paso Natural Gas Company. The nearest residence is located directly adjacent to the south property boundary of the landfill. The population, within 1 mile south of the site, is estimated to be greater than 100 persons.

The area to the north, west and east of the property is primarily open range with some oil and gas exploration activity. No significant agricultural use or livestock were noted in the immediate vicinity of the site.

5.2 SURFACE WATER CHARACTERISTICS AND USE

The Kirtland site is located along Stevens Arroyo (Figure 2-1). The arroyo drainage trends southwest and joins with the San Juan River within approximately 5 miles. Adjacent to the north boundary of the landfill, the arroyo drains westerly. No surface water was present during site investigation activities, however, Stevens Arroyo is listed as a special flood hazard area by the U. S. Department of Housing and Urban Development.

5.3 GROUNDWATER CHARACTERISTICS AND USE

Groundwater was not encountered during the subsurface sampling activities, therefore, the depth to the uppermost aquifer below the site has not been defined. However, water well records in San Juan County indicate that the uppermost aquifer in the vicinity of the site occurs less than 70 feet below grade. The lack of precise well elevations and well logs prevents a precise determination of the groundwater flow direction, however, regional topography suggest groundwater flow would be southwest along Stevens Arroyo.

Review of records of water wells in San Juan County prior to 1983 (U.S.G.S Open-file Report 87-385) identified 6 water wells within 1 mile south of the site and 2 miles west of the site. Table 5-1 presents the location, registration name, county well numbers, use and depth of the 6 wells. Well locations are based on the common subdivision of the land into township, ranges, sections and subsections and are presented in that order. Well locations were reviewed for six sections based on their proximity to the site and coverage of Stevens Arroyo southwest of the site. The six

TABLE 5-1
KIRTLAND

RECORDS OF WATER WELLS IN SAN JUAN COUNTY, PRIOR TO 1983

#	LOCATION	NAME	WELL #	USE	DEPTH	PERFORATIONS	AQUIFER
1	29.14.06.333	Hansen, Paul F.	SJ-1407	dom	70		
2	29.15.01.123	El Paso Natural Gas	SJ-0027		1005		
3	29.15.02.33	Davie, Bill	SJ-0509	san	70		
4	29.15.36.143	Western Coal Co.	SJ-0971-Expl-1	exp	532		Kpc
5	29.15.36.143	Western Coal Co.	SJ-0971-Expl-2	exp	524		Kpc
6	30.15.36.321	GT2 Coal Well			500	470-500	

sections are:

- 30N.15W.36
- 30N.15W.35
- 30N.14W.31
- 29N.14W.6
- 29N.15W.1
- 29N.15W.2

The locations of the 6 wells in these six sections and there proximity to the site are shown in Figure 5-1. Wells 2, 4, 5, and 6 are exploratory wells that exceed 500 feet in depth. Wells 1 and 3 are domestic and sanitary water wells. However, Well 1 is located one mile south of the facility and is not believed to be downgradient of the site. Well 3 is allocated approximately 0.5 miles west of Stevens Arroyo and 2.5 miles southwest of the site. Current information does not provide exact locations of the wells, but data available indicates that no domestic wells are downgradient of the site within a distance of 2 miles.

Subsurface sampling activities identified vertical migration of compounds from the waste pits. A shallow aquifer potentially exists below the site, however due to the buffer distance of 1 mile to the nearest domestic water well, low chemical compound concentrations, and low annual precipitation (8 inches), the possibility of contamination from the site in downgradient wells is low.

5.4 SOIL AND GEOLOGY OF THE SITE

5.4.1 Soils

Site specific lithology obtained during the subsurface sampling program identified types of soils to 38.5 feet below grade. Soils below the disposed waste are primarily composed of silty sands with olive clay forming below 15 to 20 feet below grade. Appendix A provides the soil boring logs.

A general soil map prepared by the U.S. Soil Conservation Service for the eastern part of San Juan County, New Mexico (USDA/SCS,1980) shows broad areas that have a distinctive pattern of soils, relief and drainage. Typically, a map unit consists of one or more soils and some minor soils but is named for the major soils. The Kirtland Landfill is located within Stevens Arroyo on sheet number 5 and has been classified as having the major soil type of Badland-Monierco-Rock outcrop complex, moderately steep.

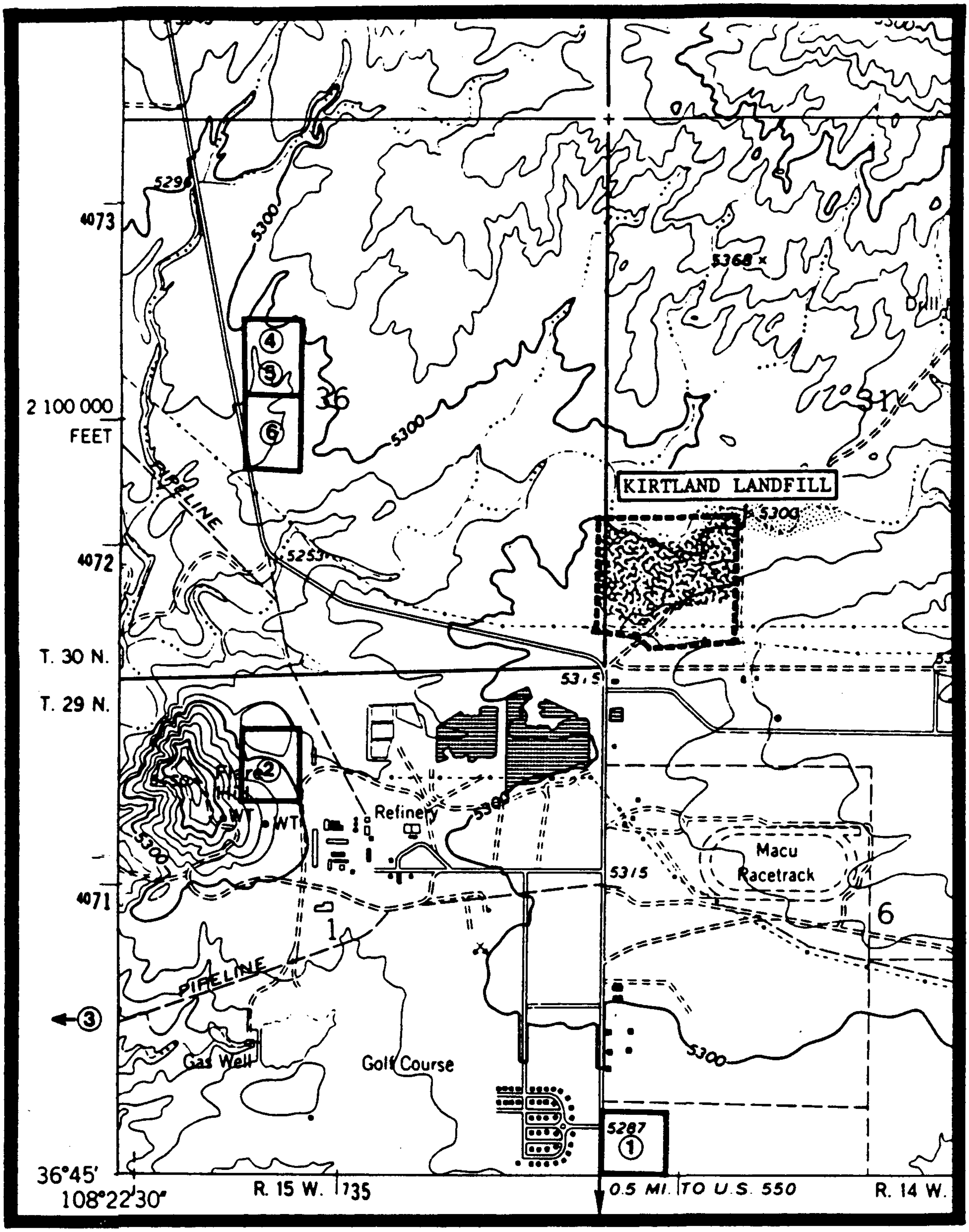


FIGURE 5-1 LOCATION OF WATER WELLS

This unit is 40 percent Badland, 5 to 30 percent slopes; 30 percent Monierco fine sandy loam, 0 to 8 percent slopes; and 20 percent Rock outcrop, 5 to 30 percent slope. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Avalon, Sheppard, and Shiprock soils on mesas and plateaus and Dork soils on mesas, plateaus, and terraces. Included areas make up about 10 percent of the total acreage.

Badland consists of nonstony, barren shale uplands that are dissected by deep, intermittent drainageways and gullies.

The Monierco soil is shallow and well drained. It formed in alluvial and eolian material derived dominantly from shale. Typiclly, the surface layer is light yellowish brown fine sandy loam about 2 inches thick. The subsoil is brown and yellowish brown clay loam and sandy clay loam about 12 inches thick. Shale is at a depth of 14 inches.

Permeability of the Monierco soil is moderately slow. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe. Where this soil has a cover of native vegetation, the average annual wetting depth is about 11 inches.

Rock outcrop consists of barren sandstone on ridges, benches, and escarpment.

This unit is used for livestock grazing and for wildlife habitat.

5.4.2 Geology

The Farmington area of San Juan County consists of plateaus and deep valleys of Cretaceous/Tertiary formations, i.e., belonging to or relating to the last period of the Mesazoic era or corresponding system of rocks. The bedrock geology comprises of low dipping (relief) sandstones and shales. The general area of the site, especially near the river beds, consists of an outwash of gravels and sands. Rock outcrops are prevalent in some locations at and near the site. The bedrock is fractured. The rocks exposed in the field area in the region are upper Cretaceous formations, which consits of the Cliff House Sandstone (uppermost unit of the Mesa Verde Group) and a normal sequence of younger Cretaceous beds culminating with the Fruitland Formation.

5.5 ASSESSMENT OF WASTE MIGRATION

Extensive waste migration from the Kirtland Landfill has not been detected, however chemical constituents have migrated vertically and horizontally. Review of EID inspection reports identified that discharge of septage materials occured from the northern dump pit down the embankment into Stevens Arroyo. Several discharges were recorded from 1976 to 1979.

The highest concentrations of compounds in Borings B3 and B4 at the dump pit were detected at the 30 and 40 foot depths, respectively. This is suspected to result from the borings being completed at 25 degree angles to intersect below the pits where the potential for vertical migration is the highest.

The subsurface soil investigation results show that chemical concentrations generally decrease with depth in Borings B1 and B4 (Table 3-1).

Because Boring B4 was located approximately south of the dump pit's northern berm, the detection of chemical compounds in the samples indicate that the compounds have migrated horizontally northward in addition to vertical migration.

Based on available hydrogeologic information the site is potentially underlayed by a shallow aquifer. The subsurface investigation identified vertical and horizontal migration of chemical compounds from the inactive waste pit that potentially could effect the shallow aquifer. The clay materials encountered in the subsurface investigation are not providing an impermeable layer.

5.6 ENVIRONMENTAL EFFECTS

No visible environmental effects such as stressed vegetation are apparent at the Flora Vista site.

SECTION 6
RESPONSIBLE PARTY INFORMATION

The Kirtland Landfill property has been leased by the Bureau of Land Management (BLM) to the San Juan County Road Department since May 21, 1962 for use as a modified landfill.

The State of New Mexico Environmental Improvement Division (EID) reported on several occasions in their inspection reports that small quanities of oil had been dumped in the septage disposal area. The septage disposal area referred to seems to be the inactive dump pit located in the northern section of the landfill. No disposers were identified in the available background data reviewed. Dumping of petroleum industrial and other hazardous wastes is presently prohibited by the County as well as by the BLM. Specifically no potential off-site contributors are known.

SECTION 7
SUMMARY OF PAST RESPONSE ACTIVITIES

There have been no past attempts to remediate any perceived environmental problems at the Kirtland site with the exception of the closure and berming of the inactive septic waste and dump pits. BLM conducted a Preliminary Assessment Study at the Kirtland site that included a limited amount of soil/waste sampling in August 1986. Samples of the inactive septic waste and surface liquid were collected and analyzed. The flash point of the solid composite waste sample collected from the five locations at the two on-site inactive septic waste pits was measured to be greater than 100°C, indicating the wastes in the inactive septic waste pit were not potentially flammable and ignitable. The wastes did not exhibit reactivity or corrosivity characteristics. The waste sample also detected barium and lead, but at a concentration below EP toxicity levels. Chromium (300 ug/l), copper (1,570 ug/l), manganese (7,120 ug/l) and lead (2,070 ug/l) were detected above the National Primary and Secondary Drinking Water Standards in the liquid/surface water sample.

The analytical findings for a composite waste sample collected during the PA indicated that the wastes contain elevated concentrations of benzene (106 ug/Kg), and exylene (379 ug/Kg). The liquid sample contained toluene (520 ug/l), and phenol (480 ug/l).

SECTION 8
SITE CLASSIFICATION AND RANKING

The EPA Potential Hazardous Waste Site - Site Inspection Report (EPA Form 2070-13) for the Kirtland Landfill is included in Appendix D. The Kirtland site has been classified as a Level III site. The site has also been ranked using the Uncontrolled Hazardous Waste Site Ranking System (HRS). The HRS helps evaluate the relative potential of uncontrolled hazardous substance facilities to cause health or safety problems, or ecological or environmental damage. It is a means for applying uniform technical judgement regarding the potential hazards presented by the facility relative to other facilities. The HRS assigns three scores to a hazardous facility:

- S_M reflects the potential for harm to humans or the environment from migration of a hazardous substance away from the facility by routes involving groundwater, surface water, or air. It is a composite of separate scores for each of the three routes.
- S_{FE} reflects the potential for harm from fire and explosion with hazardous substances at the facility (i.e., no migration need be involved).
- S_{DC} reflects the potential for harm from direct contact with hazardous substances at the facility (i.e., no migration need be involved).

The score for each hazard mode (migration, fire and explosion and direct contact) or route is obtained by considering a set of factors that characterize the potential of the facility to cause harm. The Flora Vista site received the following scores:

S_M = 6.03
S_{FE} = 0
S_{DC} = 0

A score of 28.5 for S_M places a facility of EPA's National Priority List. The HRS data sheets for the Kirtland site are included in Appendix E.

SECTION 9
RECOMMENDED ACTIONS

The results of the Kirtland Landfill site investigation indicate that the inactive septic and dump pits contain several organic compounds in the disposed waste materials. Several of these compounds have migrated vertically downward and were detected at depths to 40 feet. The highest concentrations of compounds in Borings B2 and B3 were detected at the 35 and 30 foot depths, respectively. This is suspected to result from the borings being completed at 25 degree angles to intersect below the pits where the potential for vertical migration is the highest. Some compounds have also migrated horizontally from the dump pit as were evidenced by chemical constituents detected in Borehole B4 located north of the actual waste pit.

Available hydrogeologic information indicates that a shallow aquifer (at a depth approximately 70 feet below the surface) possibly underlays the site. Groundwater was not encountered during subsurface sampling activities and clay materials identified did not completely restrict the vertical/horizontal migration of chemical compounds.

Based on the site investigation results and available information the potential for migration of chemical constituents to a shallow aquifer exists. Therefore, WESTON recommends the following activities be initiated:

- Restrict access to and contain both of the inactive septic pits; and
- Conduct a subsurface investigation to define the local aquifer and potential resulting contamination.

Several hazardous substances were detected in the active inactive septic waste pit. Due to the waste contamination this pit should be closed to restrict an increase in waste volume. Surface liquids from the pit should be removed and properly disposed of and the pit capped with an impermeable cover to reduce migration from precipitation. The acceptance of inactive septic waste should be discontinued at the site unless measures for screening and evaluating contents of wastes can be initiated.

Access to both inactive septic pit areas should be restricted to reduce the potential for direct contact by persons on site. This has primarily been completed by the existing fencing surrounding each pit. In general, the northern and western sections of the landfill should be restricted from all persons. An impermeable surface barrier should also be constructed surrounding each pit to reduce the potential for off-site surface migration of the waste.

A subsurface investigation should be conducted to define the local aquifer and potential resulting contamination from the inactive septic and dump pits. The investigation should include the subsurface soil sampling and the installation of several groundwater monitoring wells. Subsurface soil sampling and analysis should be conducted at both pits to further characterize any vertical and horizontal migration of compounds from the pit. Several shallow (20 foot) borings should be conducted on each side of the pits to define any horizontal migration of the waste or chemical constituents. Due to the close proximity of the pits to the western and northern property boundaries of the landfill, it is recommended that at least four monitoring wells be installed to establish the local groundwater gradient without conducting off-site sampling activities. The four wells should potentially be located:

1. Adjacent to the western edge of the inactive septic pit;
2. Adjacent to the northern edge of the dump pit;
3. Adjacent to the north west corner of the property; and
4. Along the center of the eastern property boundary.

The four wells will potentially provide information on the local groundwater gradient, potential groundwater contamination resulting directly from the pits, upgradient water quality data, and downgradient water quality exiting the site.

The recommended actions will reduce migration of hazardous compounds, restrict direct contact with waste materials and define if on-site and off-site contamination of groundwater has occurred. Analysis of the additional data would determine what (if any) further remedial studies or actions are required at the site.

APPENDIX A

SOIL BORING LOGS

WELL LOG

Page 1 of 1

Well No. KLF-B-1 Drill Company Stewart Bros Log By B Hyde

Client BLM Driller ___ Field Book No. ___

Job No. 287801-12 Date Began Thur 10/22 End ___ Log Date Thur 10/22

Drilling Method 4 HSA 25° Rig Failing F-10

Sampling Method Continuous SS No Samples ___

Casing Size and Type ___ Screen Size ___ Joint Type ___ Pipe Length ___

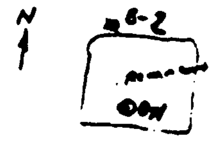
Type of Pack ___ Type of Seal ___

Emplacement Method ___ Emplacement Method ___

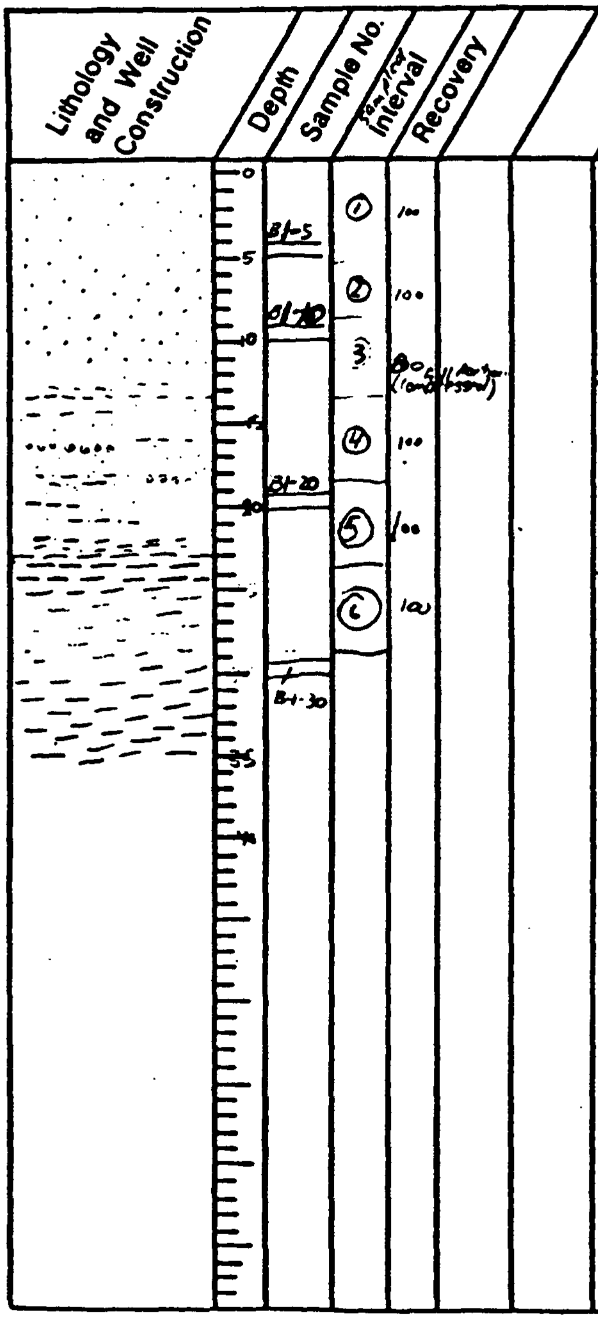
Interval ___ Interval ___

Development Method ___ Gallons Removed ___

Comments ___



SEPTIC LAGOON
KIRTLAND LF



Description

dry fine sand, mod well sorted, scattered pebbles
FILL

FILL
NATIVE
Slightly silty fine gr sand, tan to brown, silt ~15%, occasional silt and a few clay layers, clay band near 13.5', sand is coarser gr s?? (fine), scattered organic stringers (carbonized)

Fines downwards

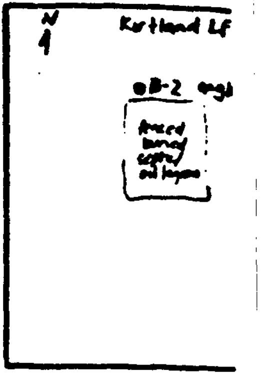
silt and clay, tan to olive, sparse carbonized ??s
alternating bands 1-3" of silt/clay

Clay Olive clay, beginning to develop shaly partings.

TD 33.5 Swelling stuck sampler inside auger.

Remarks

Location



WELL LOG

Page____ of____

Borehole ~~Well~~ No. KLF-B2 Drill Company Stewart Bros Log By B.Hyde

Client BLM Driller ____ Field Book No. ____

Job No. ____ Date Began 10/22 End ____ Log Date ____

Drilling Method angle HSA, 25° to South toward [illegible] Rig ____

Sampling Method continuous ss from 3.85' to TD No Samples ____

Casing Size and Type ____ Screen Size ____ Joint Type ____ Pipe Length ____

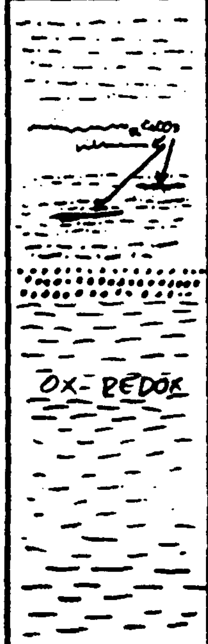
Type of Pack ____ Type of Seal ____

Emplacement Method ____ Emplacement Method ____

Interval ____ Interval ____

Development Method ____ Gallons Removed ____

Comments 3.85 → 8.85, 8.85 - 13.85, 13.85 15.85, 15.85 - [illegible], [illegible], 33.85 38.85



Lithology and Well Construction	Depth	Sample No.	Sample Interval	Recovery	Runs		Description	Remarks BKgd HNU 0.5
	0						dry sandy silt, poorly sort'd, sand grains fc medgr, v dry fluffy, tan brown, sand increases w/ depth toward 3',	
	5	KLF B2-5	4.5-5.0	START 100%	①		dry fine sand mod well sort'd, gray minor silt some ca 3 inch caliche stringers	BKGD
	10	B2-10		100%	②		alternating fine sand and organic rich silt layers, lacustrine? gray to tan to dark brown layers - cyclic, some thin caliche layers as well, 1/4 to 1/8" thick,	BKGD
	15	B2-15		100%	③		- Hard SS finer gr., cemented, at 15 ft	BKGD drilled to confirm bedrock proved to be just a stringer
							Partially oxidized brown to olive clay some ox rich layers	BKGD
	20	B2-20		100%	④		reduced olive clay below 21', sparse orgs, featureless, mod well indurated	BKGD
						REDOX		
	25	B2-26			⑤		Same	
							reduced olive clay of shale parent [illegible] develope, continued sparse orgs carbonized	BKGD
	30	B2 30			⑥			
	35				⑦			
	40	B2-38.5					TD 38.5	

WELL LOG

Page 1 of 1

Well No. KLF B-3 Drill Company Stewart Bros Log By B. Hyde

Client BLM Driller _____ Field Book No. _____

Job No. 2879 01 12 Date Began 10/23 End 10/23 Log Date 10/23

Drilling Method HSA 4-25° Rig F-10 Failing

Sampling Method continuous · 5' SS No Samples _____

Casing Size and Type _____ Screen Size _____ Joint Type _____ Pipe Length _____

Type of Pack _____ Type of Seal _____

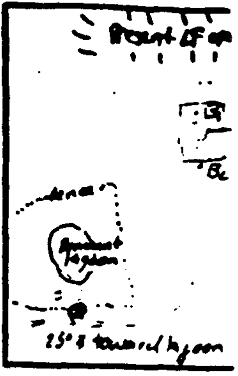
Emplacement Method _____ Emplacement Method _____

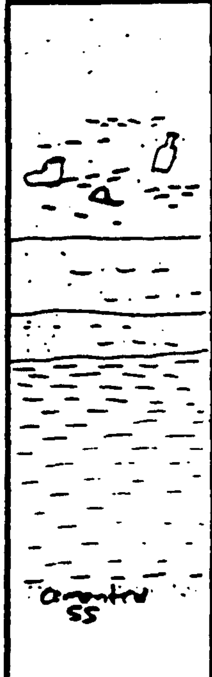
Interval _____ Interval _____

Development Method _____ Gallons Removed _____

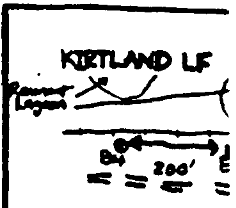
Comments _____

Location



Lithology and Well Construction	Depth	Sample No.	Interval	Recovery			Description	HNU Remarks HNU BKGD 02
	0		① 50%				dry fine sand, pebbles, organics, loose, some debris (brick chunks)	BKGD
	5	B3-5					LF debris within sandy olive silt and clay may be native sandy silt at 13.0, glass and wood debris,	BKGD
	10	B3-10	② [illegible]				— Fill Extent —	
	15						Silty Sand	BKGD
	20	B3-20	③ [illegible]				— light olive silty sand, 60:40 sand:silt, sand is fine gr	
							olive clay, org rich layers. sparse sand, mod well indurated	BKGD
	25						Olive to dark gray claystone ↓ TO 35'	
	30	B3-30	④ 0					B3-30 taken from cutti when 2 attempts to ge core failed. Terminated hole because >10' of rel impermeable clay with no readings was encountered
			⑤ 0					
	35						found cemented fine gr sandstone in tip of auger	
	40						Bedrock @ 20'	

WELL LOG



Page 1 of 1

Well No. KLF B4 Drill Company Stewart Bros Log By B. Hyde

Client BLM Driller Dan Field Book No.

Job No. Date Began 10/22 End 10/22 Log Date 10/22

Drilling Method HSA vertical Rig F-10 Failing

Sampling Method No Samples

Casing Size and Type Screen Size Joint Type Pipe Length

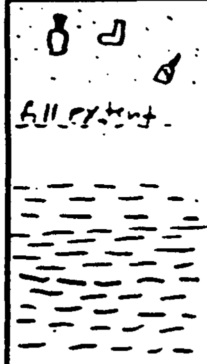
Type of Pack Type of Seal

Emplacement Method Emplacement Method

Interval Interval

Development Method Gallons Removed

Comments

Lithology and Well Construction	Depth	Sample No.	Interval	Recovery			Description	Remarks
 fill extent	0	B4-5	① 50%				Fine Sand w/ LF debris ↓	
	5	B4-11	② 0%				Mixture of silt and clay ~10% sand	
	10		75% ③				Dense, well indurated, deep olive clay	
	15	B4-20	100%				Dense olive claystone, v low permeability	causes swelling of so which then gets st augers
	20						TD 20' Bedrx · 14.5	

APPENDIX B

ANALYTICAL DATA

WESTON

WESTON ANALYTICS
SUMMARY OF OTHER PARAMETERS

Approved by: S. Marklow

RFW Batch Number: 8710S080 Client: BLM - Kirtland Land Fill

Sample Information	Customer ID:	KLF-SP	KLF-WOL
	RFW#:	-29	-30
	Matrix:	Soil	Soil
Analyte:			
Corrosivity, pH......................		6.42	7.78
Ignitability, °F......................		> 230 °	> 230 °

ND = Not detected at detection limits.

WESTON

WESTON ANALYTICS
METALS DATA SUMMARY

Approved by: S. Markham

RFW Batch Number: 8710S080 Client: BLM - Kirtland Land Fill Page 1 of 5

Sample Information				
Customer ID:	-	-	-	KLF-B1-5,-10 -13/-14
RFW#:	-	Prep Blank	Method Spike	
Matrix:	-	EP Toxicity Extract	EP Toxicity Extract	EP Toxicity Extract
Units:	mg/L	mg/L	mg/L	mg/L
Analyte:	Detection Limits			
Arsenic (As)	0.2	ND	94 %	ND
Barium (Ba)	0.2	ND	91 %	ND
Cadmium (Cd)	0.1	ND	88 %	ND
Chromium (Cr)	0.1	ND	91 %	ND
Lead (Pb)	0.025	ND	92 %	ND
Mercury (Hg)	0.0002	ND	98 %	0.0010
Selenium (Se)	0.2	ND	93 %	ND
Silver (Ag)	0.1	ND	54 %	ND

ND = Not detected at detection limits.

WESTON

WESTON ANALYTICS
METALS DATA SUMMARY

Approved by: S. Marklow

RFW Batch Number: 8710S080　　Client: BLM - Kirtland Land Fill　　Page 2 of 5

Sample Information	Customer ID:	-	KLF-B1-20,-30	KLF-B2-5,-10	KLF-B2-15
	RFW#:	-	-15/-16	-17/18	-19
	Matrix:	-	EP Toxicity Extract		EP Toxicity Extract
	Units:	mg/L	mg/L	mg/L	mg/L
Analyte:		Detection Limits			
Arsenic (As)		0.2	ND	ND	ND
Barium (Ba)		0.2	ND	ND	ND
Cadmium (Cd)		0.1	ND	ND	ND
Chromium (Cr)		0.1	ND	ND	ND
Lead (Pb)		0.025	ND	ND	ND
Mercury (Hg)		0.0002	0.0009	0.0010	0.0007
Selenium (Se)		0.2	ND	ND	ND
Silver (Ag)		0.1	ND	ND	ND

ND = Not detected at detection limits.

WESTON

WESTON ANALYTICS
METALS DATA SUMMARY

Approved by: S. Macklow

RFW Batch Number: 8710S080 Client: BLM - Kirtland Land Fill Page 3 of 5

	Customer ID:	-	KLF-B2-30,-40	KLF-B3-5,-10	KLF-B3-20,-30
Sample	RFW#:	-	-20/-21	-22/-23	-24/-25
Information	Matrix:	-	EP Toxicity Extract		EP Toxicity Extract
	Units:	mg/L	mg/L	mg/L	mg/L
Analyte:		Detection Limits			
Arsenic (As)		0.2	ND	ND	ND
Barium (Ba)		0.2	ND	ND	ND
Cadmium (Cd)		0.1	ND	ND	ND
Chromium (Cr)		0.1	ND	ND	ND
Lead (Pb)		0.025	ND	ND	ND
Mercury (Hg)		0.0002	0.0047	0.0097	0.0015
Selenium (Se)		0.2	ND	ND	ND
Silver (Ag)		0.1	ND	ND	ND

ND = Not detected at detection limits.

WESTON ANALYTICS
METALS DATA SUMMARY

Approved by:

RFW Batch Number: 8710S080 Client: BLM - Kirtland Land Fill Page 4 of 5

Sample Information Customer ID:	-	KLF-B4-5,-11	KLF-B4-20	KLF-SP
RFW#:	-	-26/-27	-28	-29
Matrix:	-	EP Toxicity Extract		EP Toxicity Extract
Units:	mg/L	mg/L	mg/L	mg/L
Analyte:	Detection Limit			
Arsenic (As)	0.2	ND	8.47	ND
Barium (Ba)	0.2	0.27	1.81	0.29
Cadmium (Cd)	0.1	ND	0.118	ND
Chromium (Cr)	0.1	ND	0.309	ND
Lead (Pb)	0.025	ND	2.0	ND
Mercury (Hg)	0.0002	0.0028	0.0003	0.0002
Selenium (Se)	0.2	ND	2.06	ND
Silver (Ag)	0.1	ND	ND	ND

ND=Not detected at detection limits.

WESTON

WESTON ANALYTICS
METALS DATA SUMMARY

Approved by: S. Markham

RFW Batch Number: 8710S080 Client: BLM - Kirtland Land Fill **Page 5 of 5**

Sample Information	Customer ID:	-	KLF-WOL
	RFW#:	-	-30
	Matrix:	-	EP Toxicity Extract
	Units:	mg/L	mg/L
Analyte:		Detection <u>Limits</u>	
Arsenic (As)		0.2	ND
Barium (Ba)		0.2	0.23
Cadmium (Cd)		0.1	ND
Chromium (Cr)		0.1	ND
Lead (Pb)		0.025	ND
Mercury (Hg)		0.0002	ND
Selenium (Se)		0.2	ND
Silver (Ag)		0.1	ND

ND = Not detected at detection limits.

Date Received: 10/26/87
Date Extracted: 11/5/87
Date Analyzed: 11/23/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
SEMI-VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: 87-10-S080 Client: BLM - Kirtland Land Fill Page 1 of 10

Sample Information	Cust ID:	-	-	-	KLF-B1-5,10
	RFW#:	-	Blank	Blank Spk	-13/-14
	Matrix:	-	Soil	Soil	Soil
	D.F.:	-	33.33	33.33	33.33
	Units:	ug/kg	ug/kg	% Recovery	ug/kg
Surrogate Recovery (%)	2-Fluorophenol:	-	82 %	88 %	74 %
	Phenol-d5:	-	77 %	85 %	71 %
	2,4,6-Br3-Phenol:	-	121 %	120 %	88 %
	Nitrobenzene-d5:	Detection	85 %	85 %	79 %
	2-Fluorobiphenyl:	Limits	81 %	86 %	88 %
	p-Terphenyl-d14:	-	108 %	108 %	110 %
Phenol		10	ND	91 %	ND
bis(2-Chloroethyl)Ether		10	ND	ND	ND
2-Chlorophenol		10	ND	97 %	ND
1,3-Dichlorobenzene		10	ND	ND	ND
1,4-Dichlorobenzene		10	ND	103 %	ND
Benzyl Alcohol		10	ND	ND	ND
1,2-Dichlorobenzene		10	ND	ND	ND
2-Methylphenol		10	ND	ND	ND
bis(2-Chloroisopropyl)Ether		10	ND	ND	ND
4-Methylphenol		10	ND	ND	ND
N-Nitroso-di-n-propylamine		10	ND	72 %	ND
Hexachloroethane		10	ND	ND	ND
Nitrobenzene		10	ND	ND	ND
Isophorone		10	ND	ND	ND
2-Nitrophenol		10	ND	ND	ND
2,4-Dimethylphenol		10	ND	ND	ND
Benzoic Acid		50	ND	ND	ND
bis(2-Chloroethoxy)Methane		10	ND	ND	ND
2,4-Dichlorophenol		10	ND	ND	ND
1,2,4-Trichlorobenzene		10	ND	84 %	ND
Naphthalene		10	ND	ND	ND
4-Chloroaniline		10	ND	ND	ND
Hexachlorobutadiene		10	ND	ND	ND
4-Chloro-3-methylphenol		10	ND	145 %	ND
2-Methylnaphthalene					

Approved by:

RFW Batch Number: 87-10-S080 Client: BLM - Kirtland Land Fill Page 2 of 10

Cust ID: RFW#:	Detection Limits	- Blank	- Blank Spk	KLF-B1-5,10 -13/-14
2,4,6-Trichlorophenol.............	10	ND	ND	ND
2,4,5-Trichlorophenol.............	50	ND	ND	ND
2-Chloronaphthalene...............	10	ND	ND	ND
2-Nitroaniline....................	50	ND	ND	ND
Dimethyl Phthalate................	10	ND	ND	ND
Acenaphthylene....................	10	ND	ND	ND
3-Nitroaniline....................	50	ND	ND	ND
Acenaphthene......................	10	ND	103 %	ND
2,4-Dinitrophenol.................	50	ND	ND	ND
4-Nitrophenol.....................	50	ND	81 %	ND
Dibenzofuran......................	10	ND	ND	ND
2,4-Dinitrotoluene................	10	ND	97 %	ND
2,6-Dinitrotoluene................	10	ND	ND	ND
Diethyl Phthalate.................	10	ND	ND	ND
4-Chlorophenyl-phenylether........	10	ND	ND	ND
Fluorene..........................	10	ND	ND	ND
4-Nitroaniline....................	50	ND	ND	ND
4,6-Dinitro-2-methylphenol........	50	ND	ND	ND
N-Nitrosodiphenylamine............	10	ND	ND	ND
4-Bromophenyl-phenylether.........	10	ND	ND	ND
Hexachlorobenzene.................	10	ND	ND	ND
Pentachlorophenol.................	50	ND	63 %	ND
Phenanthrene......................	10	ND	ND	ND
Anthracene........................	10	ND	ND	ND
di-n-Butyl Phthalate..............	10	ND	ND	ND
Fluoranthene......................	10	ND	ND	ND
Pyrene............................	10	ND	78 %	ND
Butyl Benzyl Phthalate............	10	ND	ND	ND
3,3'-Dichlorobenzidine............	20	ND	ND	ND
Benzo(a)Anthracene................	10	ND	ND	ND
bis(2-Ethylhexyl)Phthalate........	10	ND	ND	690
Chrysene..........................	10	ND	ND	ND
di-n-Octyl Phthalate..............	10	ND	ND	ND
Benzo(b)Fluoranthene..............	10	ND	ND	ND
Benzo(k)Fluoranthene..............	10	ND	ND	ND
Benzo(a)Pyrene....................	10	ND	ND	ND
Indeno(1,2,3-cd)Pyrene....	10			

Date Received: 10/26/87
Date Extracted: 11/5/87
Date Analyzed: 11/23/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
SEMI-VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: 87-10-S080 Client: BLM - Kirtland Land Fill Page 3 of 10

	Cust ID:	-	KLF-B1-20,30	KLF-B2-5,10	KLF-B2-15
Sample	RFW#:	-	-15/-16	-17/-18	-19
Information	Matrix:	-	Soil	Soil	Soil
	D.F.:	-	33.33	33.33	33.33
	Units:	ug/kg	ug/kg	ug/kg	ug/kg
	2-Fluorophenol:	-	52 %	71 %	70 %
Surrogate	Phenol-d5:	-	49 %	73 %	73 %
Recovery (%)	2,4,6-Br3-Phenol:	-	64 %	108 %	101 %
	Nitrobenzene-d5:	Detection	57 %	76 %	80 %
	2-Fluorobiphenyl:	Limits	64 %	82 %	88 %
	p-Terphenyl-d14:	-	98 %	116 %	116 %
Phenol..............................		10	ND	ND	ND
bis(2-Chloroethyl)Ether............		10	ND	ND	ND
2-Chlorophenol.....................		10	ND	ND	ND
1,3-Dichlorobenzene................		10	ND	ND	ND
1,4-Dichlorobenzene................		10	ND	ND	ND
Benzyl Alcohol.....................		10	ND	ND	ND
1,2-Dichlorobenzene................		10	ND	ND	ND
2-Methylphenol.....................		10	ND	ND	ND
bis(2-Chloroisopropyl)Ether.......		10	ND	ND	ND
4-Methylphenol.....................		10	ND	ND	ND
N-Nitroso-di-n-propylamine........		10	ND	ND	ND
Hexachloroethane...................		10	ND	ND	ND
Nitrobenzene.......................		10	ND	ND	ND
Isophorone.........................		10	ND	ND	ND
2-Nitrophenol......................		10	ND	ND	ND
2,4-Dimethylphenol.................		10	ND	ND	ND
Benzoic Acid.......................		50	ND	ND	ND
bis(2-Chloroethoxy)Methane........		10	ND	ND	ND
2,4-Dichlorophenol.................		10	ND	ND	ND
1,2,4-Trichlorobenzene............		10	ND	ND	ND
Naphthalene........................		10	ND	ND	ND
4-Chloroaniline....................		10	ND	ND	ND
Hexachlorobutadiene................		10	ND	ND	ND
4-Chloro-3-methylphenol...........		10	ND	ND	ND
2-Methylnaphthalene................		10	ND	ND	ND

Approved by:

RFW Batch Number: 87-10-S080 Client: BLM - Kirtland Land Fill Page 4 of 10

Cust ID: RFW#:	Detection Limits	KLF-B1-20,30 -15/-16	KLF-B2-5,10 -17/-18	KLF-B2-15 -19
2,4,6-Trichlorophenol.............	10	ND	ND	ND
2,4,5-Trichlorophenol.............	50	ND	ND	ND
2-Chloronaphthalene...............	10	ND	ND	ND
2-Nitroaniline....................	50	ND	ND	ND
Dimethyl Phthalate................	10	ND	ND	ND
Acenaphthylene....................	10	ND	ND	ND
3-Nitroaniline....................	50	ND	ND	ND
Acenaphthene......................	10	ND	ND	ND
2,4-Dinitrophenol.................	50	ND	ND	ND
4-Nitrophenol.....................	50	ND	ND	ND
Dibenzofuran......................	10	ND	ND	ND
2,4-Dinitrotoluene................	10	ND	ND	ND
2,6-Dinitrotoluene................	10	ND	ND	ND
Diethyl Phthalate.................	10	ND	ND	ND
4-Chlorophenyl-phenylether........	10	ND	ND	ND
Fluorene..........................	10	ND	ND	ND
4-Nitroaniline....................	50	ND	ND	ND
4,6-Dinitro-2-methylphenol........	50	ND	ND	ND
N-Nitrosodiphenylamine............	10	ND	ND	ND
4-Bromophenyl-phenylether.........	10	ND	ND	ND
Hexachlorobenzene.................	10	ND	ND	ND
Pentachlorophenol.................	50	ND	ND	ND
Phenanthrene......................	10	ND	ND	ND
Anthracene........................	10	ND	ND	ND
di-n-Butyl Phthalate..............	10	ND	ND	ND
Fluoranthene......................	10	ND	ND	ND
Pyrene............................	10	ND	ND	ND
Butyl Benzyl Phthalate............	10	ND	ND	ND
3,3'-Dichlorobenzidine............	20	ND	ND	ND
Benzo(a)Anthracene................	10	ND	ND	ND
bis(2-Ethylhexyl)Phthalate........	10	550	590	1000
Chrysene..........................	10	ND	ND	ND
di-n-Octyl Phthalate..............	10	ND	ND	ND
Benzo(b)Fluoranthene..............	10	ND	ND	ND
Benzo(k)Fluoranthene..............	10	ND	ND	ND
Benzo(a)Pyrene....................	10	ND	ND	ND
Indeno(1,2,3-cd)Pyrene....	10			

Date Received: 10/26/87
Date Extracted: 11/5/87
Date Analyzed: 11/23/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
SEMI-VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: 87-10-S080 Client: BLM - Kirtland Land Fill Page 5 of 10

Sample Information	Cust ID:	-	KLF-B2-30,40	KLF-B3-5,10	KLF-B3-20,30
	RFW#:	-	-20/-21	-22/-23	-24/-25
	Matrix:	-	Soil	Soil	Soil
	D.F.:	-	33.33	33.33	33.33
	Units:	ug/kg	ug/kg	ug/kg	ug/kg
Surrogate Recovery (%)	2-Fluorophenol:	-	75 %	19 %	75 %
	Phenol-d5:	-	73 %	23 %	73 %
	2,4,6-Br3-Phenol:	-	121 %	38 %	110 %
	Nitrobenzene-d5:	Detection	75 %	33 %	79 %
	2-Fluorobiphenyl:	Limits	78 %	50 %	79 %
	p-Terphenyl-d14:	-	104 %	64 %	98 %
Phenol............................		10	ND	ND	ND
bis(2-Chloroethyl)Ether...........		10	ND	ND	ND
2-Chlorophenol....................		10	ND	ND	ND
1,3-Dichlorobenzene...............		10	ND	ND	ND
1,4-Dichlorobenzene...............		10	ND	ND	ND
Benzyl Alcohol....................		10	ND	ND	ND
1,2-Dichlorobenzene...............		10	ND	ND	ND
2-Methylphenol....................		10	ND	ND	ND
bis(2-Chloroisopropyl)Ether.......		10	ND	ND	ND
4-Methylphenol....................		10	ND	ND	ND
N-Nitroso-di-n-propylamine........		10	ND	ND	ND
Hexachloroethane..................		10	ND	ND	ND
Nitrobenzene......................		10	ND	ND	ND
Isophorone........................		10	ND	ND	ND
2-Nitrophenol.....................		10	ND	ND	ND
2,4-Dimethylphenol................		10	ND	ND	ND
Benzoic Acid......................		50	ND	ND	ND
bis(2-Chloroethoxy)Methane........		10	ND	ND	ND
2,4-Dichlorophenol................		10	ND	ND	ND
1,2,4-Trichlorobenzene............		10	ND	ND	ND
Naphthalene.......................		10	ND	ND	ND
4-Chloroaniline...................		10	ND	ND	ND
Hexachlorobutadiene...............		10	ND	ND	ND
4-Chloro-3-methylphenol...........		10	ND	ND	ND
2-Methylnaphthalene......		10	ND	ND	ND

Approved by:

RFW Batch Number: 87-10-S080 Client: BLM - Kirtland Land Fill Page 6 of 10

Cust ID: RFW#:	Detection Limits	KLF-B2-30,40 -20/-21	KLF-B3-5,10 -22/-23	KLF-B3-20,30 -24/-25
2,4,6-Trichlorophenol.............	10	ND	ND	ND
2,4,5-Trichlorophenol.............	50	ND	ND	ND
2-Chloronaphthalene...............	10	ND	ND	ND
2-Nitroaniline....................	50	ND	ND	ND
Dimethyl Phthalate................	10	ND	ND	ND
Acenaphthylene....................	10	ND	ND	ND
3-Nitroaniline....................	50	ND	ND	ND
Acenaphthene......................	10	ND	ND	ND
2,4-Dinitrophenol.................	50	ND	ND	ND
4-Nitrophenol.....................	50	ND	ND	ND
Dibenzofuran......................	10	ND	ND	ND
2,4-Dinitrotoluene................	10	ND	ND	ND
2,6-Dinitrotoluene................	10	ND	ND	ND
Diethyl Phthalate.................	10	ND	ND	ND
4-Chlorophenyl-phenylether........	10	ND	ND	ND
Fluorene..........................	10	ND	ND	ND
4-Nitroaniline....................	50	ND	ND	ND
4,6-Dinitro-2-methylphenol........	50	ND	ND	ND
N-Nitrosodiphenylamine............	10	ND	ND	ND
4-Bromophenyl-phenylether.........	10	ND	ND	ND
Hexachlorobenzene.................	10	ND	ND	ND
Pentachlorophenol.................	50	ND	ND	ND
Phenanthrene......................	10	ND	ND	ND
Anthracene........................	10	ND	ND	ND
di-n-Butyl Phthalate..............	10	ND	ND	ND
Fluoranthene......................	10	ND	ND	ND
Pyrene............................	10	ND	ND	ND
Butyl Benzyl Phthalate............	10	ND	ND	ND
3,3'-Dichlorobenzidine............	20	ND	ND	ND
Benzo(a)Anthracene................	10	ND	ND	ND
bis(2-Ethylhexyl)Phthalate........	10	520	ND	1200
Chrysene..........................	10	ND	ND	ND
di-n-Octyl Phthalate..............	10	ND	ND	ND
Benzo(b)Fluoranthene..............	10	ND	ND	ND
Benzo(k)Fluoranthene..............	10	ND	ND	ND
Benzo(a)Pyrene....................	10	ND	ND	ND
Indeno(1,2,3-cd)Pyrene............	10	ND	ND	ND

Date Received: 10/26/87
Date Extracted: 11/5/87
Date Analyzed: 11/23/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
SEMI-VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: 87-10-S080 Client: BLM - Kirtland Land Fill Page 7 of 10

	Cust ID:	-	KLF-B3-20,30	KLF-B4-5,11	KLF-B4-20
Sample	RFW#:	-	-24/-25	-26/-27	-28
Information	Matrix:	-	Soil	Soil	Soil
	D.F.:	-	33.33	330	33.33
	Units:	ug/kg	ug/kg	ug/kg	ug/kg
	2-Fluorophenol:	-	75 %	70 %	68 %
Surrogate	Phenol-d5:	-	73 %	64 %	64 %
Recovery (%)	2,4,6-Br3-Phenol:	-	110 %	84 %	132 %
	Nitrobenzene-d5:	Detection	79 %	75 %	71 %
	2-Fluorobiphenyl:	Limits	79 %	98 %	73 %
	p-Terphenyl-d14:	-	98 %	110 %	95 %
Phenol..............................		10	ND	ND	ND
bis(2-Chloroethyl)Ether...........		10	ND	ND	ND
2-Chlorophenol....................		10	ND	ND	ND
1,3-Dichlorobenzene................		10	ND	ND	ND
1,4-Dichlorobenzene................		10	ND	ND	ND
Benzyl Alcohol....................		10	ND	ND	ND
1,2-Dichlorobenzene................		10	ND	ND	ND
2-Methylphenol....................		10	ND	ND	ND
bis(2-Chloroisopropyl)Ether.......		10	ND	ND	ND
4-Methylphenol....................		10	ND	ND	ND
N-Nitroso-di-n-propylamine........		10	ND	ND	ND
Hexachloroethane..................		10	ND	ND	ND
Nitrobenzene......................		10	ND	ND	ND
Isophorone........................		10	ND	ND	ND
2-Nitrophenol.....................		10	ND	ND	ND
2,4-Dimethylphenol................		10	ND	ND	ND
Benzoic Acid......................		50	ND	ND	ND
bis(2-Chloroethoxy)Methane........		10	ND	ND	ND
2,4-Dichlorophenol................		10	ND	ND	ND
1,2,4-Trichlorobenzene............		10	ND	ND	ND
Naphthalene.......................		10	ND	ND	ND
4-Chloroaniline...................		10	ND	ND	ND
Hexachlorobutadiene...............		10	ND	ND	ND
4-Chloro-3-methylphenol...........		10	ND	ND	ND
2-Methylnaphthalene...............		10	ND	ND	ND

Approved by: ________

RFW Batch Number: 87-10-S080   Client: BLM - Kirtland Land Fill   Page 8 of 10

Cust ID: RFW#:	Detection Limits	KLF-B3-20,30 -24/-25	KLF-B4-5,11 -26/-27	KLF-B4-20 -28
2,4,6-Trichlorophenol.............	10	ND	ND	ND
2,4,5-Trichlorophenol.............	50	ND	ND	ND
2-Chloronaphthalene...............	10	ND	ND	ND
2-Nitroaniline....................	50	ND	ND	ND
Dimethyl Phthalate................	10	ND	ND	ND
Acenaphthylene....................	10	ND	ND	ND
3-Nitroaniline....................	50	ND	ND	ND
Acenaphthene......................	10	ND	ND	ND
2,4-Dinitrophenol.................	50	ND	ND	ND
4-Nitrophenol.....................	50	ND	ND	ND
Dibenzofuran......................	10	ND	ND	ND
2,4-Dinitrotoluene................	10	ND	ND	ND
2,6-Dinitrotoluene................	10	ND	ND	ND
Diethyl Phthalate.................	10	ND	ND	ND
4-Chlorophenyl-phenylether........	10	ND	ND	ND
Fluorene..........................	10	ND	ND	ND
4-Nitroaniline....................	50	ND	ND	ND
4,6-Dinitro-2-methylphenol........	50	ND	ND	ND
N-Nitrosodiphenylamine............	10	ND	ND	ND
4-Bromophenyl-phenylether.........	10	ND	ND	ND
Hexachlorobenzene.................	10	ND	ND	ND
Pentachlorophenol.................	50	ND	ND	ND
Phenanthrene......................	10	ND	ND	ND
Anthracene........................	10	ND	ND	ND
di-n-Butyl Phthalate..............	10	ND	ND	ND
Fluoranthene......................	10	ND	ND	ND
Pyrene............................	10	ND	ND	ND
Butyl Benzyl Phthalate............	10	ND	ND	ND
3,3'-Dichlorobenzidine............	20	ND	ND	ND
Benzo(a)Anthracene................	10	ND	ND	ND
bis(2-Ethylhexyl)Phthalate........	10	1200	ND	390
Chrysene..........................	10	ND	ND	ND
di-n-Octyl Phthalate..............	10	ND	ND	ND
Benzo(b)Fluoranthene..............	10	ND	ND	ND
Benzo(k)Fluoranthene..............	10	ND	ND	ND
Benzo(a)Pyrene....................	10	ND	ND	ND
Indeno(1,2,3-cd)Pyrene....	10	ND	ND	

Date Received: 10/26/87
Date Extracted: 11/5/87
Date Analyzed: 11/23/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
SEMI-VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: 87-10-S080 Client: BLM - Kirtland Land Fill Page 9 of 10

Sample Information	Cust ID:	-	KLF-SP	KLF-WOL
	RFW#:	-	-29	-30
	Matrix:	-	Soil	Soil
	D.F.:	-	41000	8250
	Units:	ug/kg	ug/kg	ug/kg
Surrogate Recovery (%)	2-Fluorophenol:	-	Dilution Loss	0 %
	Phenol-d5:	-	"	0 %
	2,4,6-Br3-Phenol:	-	"	1 %
	Nitrobenzene-d5:	Detection	"	0 %
	2-Fluorobiphenyl:	Limits	"	0 %
	p-Terphenyl-d14:	-	"	0 %
Phenol..............................		10	ND	ND
bis(2-Chloroethyl)Ether............		10	ND	ND
2-Chlorophenol.....................		10	ND	ND
1,3-Dichlorobenzene................		10	ND	ND
1,4-Dichlorobenzene................		10	ND	ND
Benzyl Alcohol.....................		10	ND	ND
1,2-Dichlorobenzene................		10	ND	ND
2-Methylphenol.....................		10	ND	ND
bis(2-Chloroisopropyl)Ether.......		10	ND	ND
4-Methylphenol.....................		10	ND	ND
N-Nitroso-di-n-propylamine........		10	ND	ND
Hexachloroethane...................		10	ND	ND
Nitrobenzene.......................		10	ND	ND
Isophorone.........................		10	ND	ND
2-Nitrophenol......................		10	ND	ND
2,4-Dimethylphenol.................		10	ND	ND
Benzoic Acid.......................		50	ND	ND
bis(2-Chloroethoxy)Methane........		10	ND	ND
2,4-Dichlorophenol.................		10	ND	ND
1,2,4-Trichlorobenzene............		10	ND	ND
Naphthalene........................		10	ND	ND
4-Chloroaniline....................		10	ND	ND
Hexachlorobutadiene................		10	ND	ND
4-Chloro-3-methylphenol...........		10	ND	ND
2-Methylnaphthalene................		10	ND	ND

Approved by: ________

RFW Batch Number: 87-10-S080 Client: BLM - Kirtland Land Fill Page 10 of 10

Cust ID: RFW#:	Detection Limits	KLF-SP -29	KLF-WOL -30
2,4,6-Trichlorophenol.............	10	ND	ND
2,4,5-Trichlorophenol.............	50	ND	ND
2-Chloronaphthalene...............	10	ND	ND
2-Nitroaniline....................	50	ND	ND
Dimethyl Phthalate................	10	ND	ND
Acenaphthylene....................	10	ND	ND
3-Nitroaniline....................	50	ND	ND
Acenaphthene......................	10	ND	ND
2,4-Dinitrophenol.................	50	ND	ND
4-Nitrophenol.....................	50	ND	ND
Dibenzofuran......................	10	ND	ND
2,4-Dinitrotoluene................	10	ND	ND
2,6-Dinitrotoluene................	10	ND	ND
Diethyl Phthalate.................	10	ND	ND
4-Chlorophenyl-phenylether........	10	ND	ND
Fluorene..........................	10	ND	ND
4-Nitroaniline....................	50	ND	ND
4,6-Dinitro-2-methylphenol........	50	ND	ND
N-Nitrosodiphenylamine............	10	ND	ND
4-Bromophenyl-phenylether.........	10	ND	ND
Hexachlorobenzene.................	10	ND	ND
Pentachlorophenol.................	50	ND	ND
Phenanthrene......................	10	ND	ND
Anthracene........................	10	ND	ND
di-n-Butyl Phthalate..............	10	ND	ND
Fluoranthene......................	10	ND	ND
Pyrene............................	10	ND	ND
Butyl Benzyl Phthalate............	10	ND	ND
3,3'-Dichlorobenzidine............	20	ND	ND
Benzo(a)Anthracene................	10	ND	ND
bis(2-Ethylhexyl)Phthalate........	10	ND	ND
Chrysene..........................	10	ND	ND
di-n-Octyl Phthalate..............	10	ND	ND
Benzo(b)Fluoranthene..............	10	ND	ND
Benzo(k)Fluoranthene..............	10	ND	ND
Benzo(a)Pyrene....................	10	ND	ND
Indeno(1,2,3-cd)Pyrene............	10	ND	ND

Date Sampled: 10/22/87
Date Received: 10/26/87
Date Analyzed: 11/4/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

Approved by:

RFW Batch Number: 87-10-S080 Client: BLM - Kirtland Land Fill Page 1 of 14

Sample Information	Cust ID:	-	Blank	KLF-B1-5	KLF-B1-10
	RFW#:	-	-	-13	-14
	Matrix:	-	Soil	Soil	Soil
	D.F.:	-	1	*5	*5
	Units:	ug/kg	ug/kg	ug/kg	ug/kg
Surrogate Recovery: (%)	Toluene-d8:	-	96 %	94 %	95 %
	Bromofluorobenzene:	Detection Limits	94 %	102 %	96 %
	1,2-Dichloroethane-d4:		100 %	94 %	96 %
Chloromethane		10	ND	ND	ND
Bromomethane		10	ND	ND	ND
Vinyl Chloride		10	ND	ND	ND
Chloroethane		10	ND	ND	ND
Methylene Chloride		5	ND	ND	ND
Acetone		10	ND	ND	ND
Carbon Disulfide		5	ND	ND	ND
1,1-Dichloroethene		5	ND	ND	ND
1,1-Dichloroethane		5	ND	ND	ND
Trans-1,2-Dichloroethene		5	ND	ND	ND
Chloroform		5	ND	ND	ND
1,2-Dichloroethane		5	ND	ND	ND
2-Butanone		10	ND	ND	ND
1,1,1-Trichloroethane		5	ND	ND	140
Carbon Tetrachloride		5	ND	ND	ND
Vinyl Acetate		10	ND	ND	ND
Bromodichloromethane		5	ND	ND	ND
1,2 Dichloropropane		5	ND	ND	ND
Trans-1,3-Dichloropropene		5	ND	ND	ND
Trichloroethene		5	ND	ND	ND
Dibromochloromethane		5	ND	ND	ND
1,1,2-Trichloroethane		5	ND	ND	ND
Benzene		5	ND	ND	ND
cis-1,3-Dichloropropene		5	ND	ND	ND
2-Chloroethylvinylether		10	ND	ND	ND

Cust ID: RFW#:	Detection Limits	Blank -	KLF-B1-5 -13	KLF-B1-10 -14
Bromoform..........................	5	ND	ND	ND
4-Methyl-2-pentanone.................	10	ND	ND	ND
2-Hexanone.........................	10	ND	ND	ND
Tetrachloroethene....................	5	ND	ND	ND
1,1,2,2-Tetrachloroethane............	5	ND	ND	ND
Toluene..............................	5	ND	32	ND
Chlorobenzene........................	5	ND	ND	ND
Ethylbenzene.........................	5	ND	ND	ND
Styrene..............................	5	ND	ND	ND
Total Xylenes........................	5	ND	ND	ND

* = Detection limit must be multiplied by dilution factor.

ND=Not detected at specified detection limit. B=Present in blank.
J=Present at less than detection limit. NR=Not requested.

Date Sampled: 10/22/87
Date Received: 10/26/87
Date Analyzed: 11/4/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

Approved by:

RFW Batch Number: 87-10-S080 Client: BLM - Kirkland Land Fill Page 3 of 14

	Cust ID:	-	KLF-B1-20	KLF-B1-30	KLF-B2-5
Sample	RFW#:	-	-15	-16	-17
Information	Matrix:	-	Soil	Soil	Soil
	D.F.:	-	*5	*5	*5
	Units:	ug/kg	ug/kg	ug/kg	ug/kg
Surrogate	Toluene-d8:	-	95 %	95 %	106 %
Recovery:	Bromofluorobenzene:	Detection	95 %	97 %	110 %
(%)	1,2-Dichloroethane-d4:	Limits	99 %	103 %	96 %
Chloromethane		10	ND	ND	ND
Bromomethane		10	ND	ND	ND
Vinyl Chloride		10	ND	ND	ND
Chloroethane		10	ND	ND	ND
Methylene Chloride		5	ND	ND	ND
Acetone		10	ND	ND	91
Carbon Disulfide		5	ND	ND	ND
1,1-Dichloroethene		5	ND	ND	ND
1,1-Dichloroethane		5	ND	ND	ND
Trans-1,2-Dichloroethene		5	ND	ND	ND
Chloroform		5	ND	ND	ND
1,2-Dichloroethane		5	ND	ND	ND
2-Butanone		10	ND	ND	ND
1,1,1-Trichloroethane		5	66	62	ND
Carbon Tetrachloride		5	ND	ND	ND
Vinyl Acetate		10	ND	ND	ND
Bromodichloromethane		5	ND	ND	ND
1,2 Dichloropropane		5	ND	ND	ND
Trans-1,3-Dichloropropene		5	ND	ND	ND
Trichloroethene		5	ND	ND	ND
Dibromochloromethane		5	ND	ND	ND
1,1,2-Trichloroethane		5	ND	ND	ND
Benzene		5	ND	ND	ND
cis-1,3-Dichloropropene		5	ND	ND	ND
2-Chloroethylvinylether		10	ND	ND	ND

RFW Batch Number: 87-10-S080 Client: BLM - Kirkland Land Fill Page 4 of 14

Cust ID: RFW#:	Detection Limits	KLF-B1-20 -15	KLF-B1-30 -16	KLF-B2-5 -17
Bromoform..............................	5	ND	ND	ND
4-Methyl-2-pentanone................	10	ND	ND	ND
2-Hexanone..........................	10	ND	ND	ND
Tetrachloroethene.....................	5	ND	ND	ND
1,1,2,2-Tetrachloroethane...........	5	ND	ND	ND
Toluene............................	5	95	60	ND
Chlorobenzene.......................	5	ND	ND	ND
Ethylbenzene........................	5	ND	ND	ND
Styrene.............................	5	ND	ND	ND
Total Xylenes.......................	5	ND	ND	ND

* = Detection limit must be multiplied by dilution factor.

ND=Not detected at specified detection limit. B=Present in blank.
J=Present at less than detection limit. NR=Not requested.

Date Sampled: 10/22/87
Date Received: 10/26/87
Date Analyzed: 11/4/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

Approved by:

RFW Batch Number: 87-10-S080 Client: BLM - Kirkland Land Fills Page 5 of 14

Sample Information	Cust ID:	-	KLF-B2-10	KLF-B2-15	KLF-B2-30
	RFW#:	-	-18	-19	-20
	Matrix:	-	Soil	Soil	Soil
	D.F.:	-	*5	*5	*5
	Units:	ug/kg	ug/kg	ug/kg	ug/kg
Surrogate	Toluene-d8:	-	96 %	97 %	98 %
Recovery:	Bromofluorobenzene:	Detection	128 %	104 %	104 %
(%)	1,2-Dichloroethane-d4:	Limits	106 %	105 %	101 %
Chloromethane		10	ND	ND	ND
Bromomethane		10	ND	ND	ND
Vinyl Chloride		10	ND	ND	ND
Chloroethane		10	ND	ND	ND
Methylene Chloride		5	ND	ND	ND
Acetone		10	100	68	51
Carbon Disulfide		5	ND	ND	ND
1,1-Dichloroethene		5	ND	ND	ND
1,1-Dichloroethane		5	ND	ND	ND
Trans-1,2-Dichloroethene		5	ND	ND	ND
Chloroform		5	ND	ND	ND
1,2-Dichloroethane		5	ND	ND	ND
2-Butanone		10	ND	ND	ND
1,1,1-Trichloroethane		5	83	530	ND
Carbon Tetrachloride		5	ND	ND	ND
Vinyl Acetate		10	ND	ND	ND
Bromodichloromethane		5	ND	ND	ND
1,2 Dichloropropane		5	ND	ND	ND
Trans-1,3-Dichloropropene		5	ND	ND	ND
Trichloroethene		5	ND	ND	ND
Dibromochloromethane		5	ND	ND	ND
1,1,2-Trichloroethane		5	ND	ND	ND
Benzene		5	ND	ND	ND
cis-1,3-Dichloropropene		5	ND	ND	ND
2-Chloroethylvinylether		10	ND	ND	ND

Cust ID: RFW#:	Detection Limits	KLF-B2-10 -18	KLF-B2-15 -19	KLF-B2-30 -20
Bromoform	5	ND	ND	ND
4-Methyl-2-pentanone	10	ND	ND	ND
2-Hexanone	10	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND	ND
Toluene	5	54	ND	63
Chlorobenzene	5	ND	ND	ND
Ethylbenzene	5	ND	ND	ND
Styrene	5	ND	ND	ND
Total Xylenes	5	ND	ND	ND

* = Detection limit must be multiplied by dilution factor.

ND=Not detected at specified detection limit. B=Present in blank.
J=Present at less than detection limit. NR=Not requested.

Date Sampled: 10/22/87
Date Received: 10/26/87
Date Analyzed: 11/4/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

Approved by:

RFW Batch Number: 87-10-S080 Client: BLM - Kirkland Land Fill Page 7 of 14

Sample Information	Cust ID:	-	KLF-B42-40	KLF-B3-5	KLF-B3-10
	RFW#:	-	-21	-22	-23
	Matrix:	-	Soil	Soil	Soil
	D.F.:	-	*5	*5	*5
	Units:	ug/kg	ug/kg	ug/kg	ug/kg
Surrogate	Toluene-d8:	-	93 %	106 %	105 %
Recovery:	Bromofluorobenzene:	Detection	104 %	102 %	106 %
(%)	1,2-Dichloroethane-d4:	Limits	106 %	105 %	108 %
Chloromethane		10	ND	ND	ND
Bromomethane		10	ND	ND	ND
Vinyl Chloride		10	ND	ND	ND
Chloroethane		10	ND	ND	ND
Methylene Chloride		5	ND	ND	ND
Acetone		10	ND	ND	ND
Carbon Disulfide		5	ND	ND	ND
1,1-Dichloroethene		5	ND	ND	ND
1,1-Dichloroethane		5	ND	ND	ND
Trans-1,2-Dichloroethene		5	ND	ND	ND
Chloroform		5	ND	ND	ND
1,2-Dichloroethane		5	ND	ND	ND
2-Butanone		10	ND	ND	ND
1,1,1-Trichloroethane		5	32	32	42
Carbon Tetrachloride		5	ND	ND	ND
Vinyl Acetate		10	ND	ND	ND
Bromodichloromethane		5	ND	ND	ND
1,2 Dichloropropane		5	ND	ND	ND
Trans-1,3-Dichloropropene		5	ND	ND	ND
Trichloroethene		5	ND	ND	ND
Dibromochloromethane		5	ND	ND	ND
1,1,2-Trichloroethane		5	ND	ND	ND
Benzene		5	ND	ND	ND
cis-1,3-Dichloropropene		5	ND	ND	ND
2-Chloroethylvinylether		10	ND	ND	ND

Cust ID: RFW#:	Detection Limits	KLF-B42-40 -21	KLF-B3-5 -22	KLF-B3-10 -23
Bromoform	5	ND	ND	ND
4-Methyl-2-pentanone	10	ND	ND	ND
2-Hexanone	10	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND	ND
Toluene	5	690	180	280
Chlorobenzene	5	ND	ND	ND
Ethylbenzene	5	ND	ND	ND
Styrene	5	ND	ND	ND
Total Xylenes	5	ND	ND	ND

* = Detection limit must be multiplied by dilution factor.

ND=Not detected at specified detection limit. B=Present in blank.
J=Present at less than detection limit. NR=Not requested.

Date Sampled: 10/22/87
Date Received: 10/26/87
Date Analyzed: 11/4/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

Approved by:

RFW Batch Number: 87-10-S080 Client: BLM - Kirkland Land Fill Page 9 of 14

Sample Information	Cust ID:	-	KLF-B3-20	KLF-B3-30	KLF-B4-5
	RFW#:	-	-24	-25	-26
	Matrix:	-	Soil	Soil	Soil
	D.F.:	-	*5	*20	*5
	Units:	ug/kg	ug/kg	ug/kg	ug/kg
Surrogate	Toluene-d8:	-	106 %	95 %	106 %
Recovery:	Bromofluorobenzene:	Detection	106 %	135 %	105 %
(%)	1,2-Dichloroethane-d4:	Limits	104 %	103 %	104 %
Chloromethane........................		10	ND	ND	ND
Bromomethane.........................		10	ND	ND	ND
Vinyl Chloride.......................		10	ND	ND	ND
Chloroethane.........................		10	ND	ND	ND
Methylene Chloride...................		5	ND	250	34
Acetone..............................		10	ND	ND	ND
Carbon Disulfide.....................		5	ND	ND	ND
1,1-Dichloroethene...................		5	ND	ND	ND
1,1-Dichloroethane...................		5	ND	ND	ND
Trans-1,2-Dichloroethene.............		5	ND	ND	ND
Chloroform...........................		5	ND	ND	ND
1,2-Dichloroethane...................		5	ND	ND	ND
2-Butanone...........................		10	ND	ND	ND
1,1,1-Trichloroethane................		5	ND	ND	ND
Carbon Tetrachloride.................		5	ND	ND	ND
Vinyl Acetate........................		10	ND	ND	ND
Bromodichloromethane.................		5	ND	ND	ND
1,2 Dichloropropane..................		5	ND	ND	ND
Trans-1,3-Dichloropropene............		5	ND	ND	ND
Trichloroethene......................		5	ND	ND	ND
Dibromochloromethane.................		5	ND	ND	ND
1,1,2-Trichloroethane................		5	ND	ND	ND
Benzene..............................		5	ND	ND	ND
cis-1,3-Dichloropropene..............		5	ND	ND	ND
2-Chloroethylvinylether..............		10	ND	ND	ND

Cust ID: RFW#:	Detection Limits	KLF-B3-20 -24	KLF-B3-30 -25	KLF-B4-5 -26
Bromoform	5	ND	ND	ND
4-Methyl-2-pentanone	10	ND	ND	ND
2-Hexanone	10	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND	ND
Toluene	5	30	580	110
Chlorobenzene	5	ND	ND	ND
Ethylbenzene	5	ND	ND	ND
Styrene	5	ND	ND	ND
Total Xylenes	5	ND	ND	ND

* = Detection limit must be multiplied by dilution factor.

ND=Not detected at specified detection limit. B=Present in blank.
J=Present at less than detection limit. NR=Not requested.

Date Sampled: 10/22/87
Date Received: 10/26/87
Date Analyzed: 11/4/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

Approved by:

RFW Batch Number: 87-10-S080 Client: BLM - Kirkland Land Fill Page 11 of 14

	Cust ID:	-	KLF-B4-11	KLF-B4-20	KLF-SP
Sample	RFW#:	-	-27	-28	-29
Information	Matrix:	-	Soil	Soil	Soil
	D.F.:	-	*5	*5	*10
	Units:	ug/kg	ug/kg	ug/kg	ug/kg
Surrogate	Toluene-d8:	-	104 %	105 %	103 %
Recovery:	Bromofluorobenzene:	Detection	102 %	107 %	102 %
(%)	1,2-Dichloroethane-d4:	Limits	103 %	102 %	102 %
Chloromethane........................		10	ND	ND	ND
Bromomethane.........................		10	ND	ND	ND
Vinyl Chloride.......................		10	ND	ND	ND
Chloroethane.........................		10	ND	ND	ND
Methylene Chloride...................		5	ND	ND	ND
Acetone..............................		10	ND	ND	110
Carbon Disulfide.....................		5	ND	ND	ND
1,1-Dichloroethene...................		5	ND	ND	ND
1,1-Dichloroethane...................		5	ND	ND	ND
Trans-1,2-Dichloroethene.............		5	ND	ND	ND
Chloroform...........................		5	ND	ND	ND
1,2-Dichloroethane...................		5	ND	ND	ND
2-Butanone...........................		10	ND	ND	ND
1,1,1-Trichloroethane................		5	ND	ND	ND
Carbon Tetrachloride.................		5	ND	ND	ND
Vinyl Acetate........................		10	ND	ND	ND
Bromodichloromethane.................		5	ND	ND	ND
1,2 Dichloropropane..................		5	ND	ND	ND
Trans-1,3-Dichloropropene............		5	ND	ND	ND
Trichloroethene......................		5	ND	ND	ND
Dibromochloromethane.................		5	ND	ND	ND
1,1,2-Trichloroethane................		5	ND	ND	ND
Benzene..............................		5	ND	ND	ND
cis-1,3-Dichloropropene..............		5	ND	ND	ND
2-Chloroethylvinylether..............		10	ND	ND	ND

RFW Batch Number: 87-10-S080 Client: BLM - Kirkland Land Fill

Cust ID: RFW#:	Detection Limits	KLF-B4-11 -27	KLF-B4-20 -28	KLF-SP -29
Bromoform	5	ND	ND	ND
4-Methyl-2-pentanone	10	ND	ND	ND
2-Hexanone	10	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND	ND
Toluene	5	610	110	470
Chlorobenzene	5	ND	ND	ND
Ethylbenzene	5	ND	ND	ND
Styrene	5	ND	ND	ND
Total Xylenes	5	ND	ND	ND

* = Detection limit must be multiplied by dilution factor.

ND=Not detected at specified detection limit. B=Present in blank.
J=Present at less than detection limit. NR=Not requested.

Date Sampled: 10/22/87
Date Received: 10/26/87
Date Analyzed: 11/4/87

WESTON ANALYTICS
GC/MS DATA SUMMARY
VOLATILE HAZARDOUS SUBSTANCE LIST COMPOUNDS

Approved by:

RFW Batch Number: 87-10-S080 Client: BLM - Kirkland Land Fill Page 13 of 14

Sample Information	Cust ID:	-	KLF-WOL
	RFW#:	-	-30
	Matrix:	-	Soil
	D.F.:	-	*5
	Units:	ug/kg	ug/kg
Surrogate Recovery: (%)	Toluene-d8:	-	113 %
	Bromofluorobenzene:	Detection Limits	90 %
	1,2-Dichloroethane-d4:		106 %
Chloromethane		10	ND
Bromomethane		10	ND
Vinyl Chloride		10	ND
Chloroethane		10	ND
Methylene Chloride		5	ND
Acetone		10	63
Carbon Disulfide		5	ND
1,1-Dichloroethene		5	ND
1,1-Dichloroethane		5	ND
Trans-1,2-Dichloroethene		5	ND
Chloroform		5	ND
1,2-Dichloroethane		5	ND
2-Butanone		10	ND
1,1,1-Trichloroethane		5	ND
Carbon Tetrachloride		5	ND
Vinyl Acetate		10	ND
Bromodichloromethane		5	ND
1,2 Dichloropropane		5	ND
Trans-1,3-Dichloropropene		5	ND
Trichloroethene		5	ND
Dibromochloromethane		5	ND
1,1,2-Trichloroethane		5	ND
Benzene		5	ND
cis-1,3-Dichloropropene		5	ND
2-Chloroethylvinylether		10	ND

Cust ID: RFW#:	Detection Limits	KLF-WOL -30
Bromoform	5	ND
4-Methyl-2-pentanone	10	ND
2-Hexanone	10	ND
Tetrachloroethene	5	ND
1,1,2,2-Tetrachloroethane	5	ND
Toluene	5	1300
Chlorobenzene	5	ND
Ethylbenzene	5	ND
Styrene	5	ND
Total Xylenes	5	ND

* = Detection limit must be multiplied by dilution factor.

ND=Not detected at specified detection limit. B=Present in blank.
J=Present at less than detection limit. NR=Not requested.

APPENDIX C

CHAIN-OF-CUSTODY FORMS

CHAIN OF CUSTODY RECORD

Location: [illegible]

SHIP TO:
Roy F. Weston
7720 Lorraine Ave Ste 105
Stockton CA 95210

ATTENTION: Dennis Jenner
Phone No. 209/957-3465

Shipper: R. Moelle
Address:
Date Shipped: 10-24-87
Shipment Service: Fed Ex
Airbill No. 508218 3386
Cooler No. 1

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Robert Moelle		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received for laboratory by: (Signature)	Date/Time
		10/26/87 | 10

Analysis laboratory should complete "sample cond. upon receipt" section below, sign and return copy to Shipper

Sample Number	No. Of Cont.	Site Identification	Date Sampled	Analysis Requested	Sample Co Upon Rece
KLF-B1-5	1-8oz	Kirtland	10-22-87	EP Tox metals EPA 8240, 8270	OK
KLF-B1-10	"	"	"	Composite 5 & 10	SAMPLE LABEL K LID MARKED KLF-
KLF-B1-20	"	"	"	EP Tox metals EPA 8240, 8270	OK
KLF-B1-30	"	"	"	Composite 20 & 30	
KLF-B2-5	"	"	"	EP Tox metals EPA 8240, 8270	
KLF-B2-10	"	"	"	Composite 5 & 10	
KLF-B2-15	"	"	"	EP Tox metals EPA 8240, 8270	
KLF-B2-30	"	"	"	EP Tox metals EPA 8240, 8270	
KLF-B2-40	"	"	"	Composite 30 & 40	
KLF-B3-5	"	"	10-23-87	EP Tox metals EPA 8240, 8270	
KLF-B3-10	"	"	"	Composite 5 & 10	
KLF-B3-20	"	"	"	EP Tox metals EPA 8240, 8270	
KLF-B3-30	"	"	"	Composite 20 & 30	
KLF-B4-5	"	"	"	EP Tox metals EPA 8240, 8270	
KLF-B4-10	"	"	"	Composite 5 & 10	
KLF-B4-20	"	"	"	EP Tox metals EPA 8240, 8270	
KLF-SP	"	"	" *	EP Tox Metals, Corrosivity, Ignitability, EPA 8240, 8270	
KLF-WX	"	"	" *	"	

Remarks: * Caution when [illegible] contain [illegible] material

White - Sampler　　Canary - Return Copy to Shipper　　Pink - Lab Copy

APPENDIX D

EPA FORM FOR SITE INVESTIGATION

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE NM

02 SITE NUMBER 2878-01-12

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site): Kirtland Landfill

02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER: Intersection of S.J. Co. Route 6500 at 6480

03 CITY: Kirtland

04 STATE: NM

05 ZIP CODE:

06 COUNTY: San Juan

07 COUNTY CODE:

08 CON DIST:

09 COORDINATES LATITUDE 364600. LONGITUDE 1082115.

10 TYPE OF OWNERSHIP (Check one)
☐ A. PRIVATE ☐ B. FEDERAL ________ ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER ________ ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION: 10 / 22 / 87 (MONTH DAY YEAR)

02 SITE STATUS: ☒ ACTIVE ☐ INACTIVE

03 YEARS OF OPERATION: 62 (BEGINNING YEAR) / present (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ________ (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ________ (Name of firm)
☐ E. STATE ☐ F. STATE CONTRACTOR ________ (Name of firm) ☒ G. OTHER BLM Contractor (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO
Robert Mueller	Field Team Leader	Weston	(818) 340-261

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO
Bert Hyde	Field Support Staff	Weston	(206) 527-203
Susan Kraemer	Field Support Staff	Weston	(818) 340-261
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
			( )
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one): ☒ PERMISSION ☐ WARRANT

18 TIME OF INSPECTION:

19 WEATHER CONDITIONS:
10/87 Sunny, Temperature 70°F
1/88 Cloudy, snowfall, temperature 10°F

IV. INFORMATION AVAILABLE FROM

01 CONTACT: Chuck Pettee

02 OF (Agency/Organization): BLM

03 TELEPHONE NO: ( )

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM: Robert Mueller

05 AGENCY:

06 ORGANIZATION: Weston

07 TELEPHONE NO.: 818/340-2610

08 DATE: 1-28-88 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NM	2878-01-12

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

☐ A SOLID
☐ B POWDER, FINES
☐ C SLUDGE
☐ D OTHER ____________ (Specify)
☐ E SLURRY
☐ F LIQUID
☐ G GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS ____________
CUBIC YARDS 35,000
NO OF DRUMS ____________

03 WASTE CHARACTERISTICS (Check all that apply)

☐ A TOXIC
☐ B CORROSIVE
☐ C RADIOACTIVE
☐ D PERSISTENT
☐ E SOLUBLE
☐ F INFECTIOUS
☐ G FLAMMABLE
☐ H IGNITABLE
☐ I HIGHLY VOLATILE
☐ J EXPLOSIVE
☐ K REACTIVE
☐ L INCOMPATIBLE
☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	35,000	Cubic Yards	Sludge Materials contaminated
OLW	OILY WASTE			in the volatile and semivolatile
SOL	SOLVENTS			organic compounds
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
	Sludge and soil contam-		Unlined Pit		
	inated w/volatile and				
	semivolatile organic				
	compounds(1,1,1,-tri-	71-55-6		530	uglKg
	chloroethane) (TO Luene)	108-88-3		1300	uglKg

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

*Roy F. Weston Site Investigation Report

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE NM
02 SITE NUMBER 2878-01-12

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A GROUNDWATER CONTAMINATION
02 ☐ OBSERVED (DATE ______) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______
04 NARRATIVE DESCRIPTION

Potential for migration of compounds to potential underlying aquifer

01 ☐ B SURFACE WATER CONTAMINATION
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

Unlikely San Juan River is over 5 miles from site

01 ☐ C CONTAMINATION OF AIR
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______
04 NARRATIVE DESCRIPTION

None

01 ☐ D FIRE/EXPLOSIVE CONDITIONS
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______
04 NARRATIVE DESCRIPTION

None

01 ☐ E DIRECT CONTACT
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______
04 NARRATIVE DESCRIPTION

None

01 ☐ F CONTAMINATION OF SOIL
02 ☐ OBSERVED (DATE 10-22-87) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: 5+ (Acres)
04 NARRATIVE DESCRIPTION

Soil below waste pits has been confirmed by sample analysis to contain volatile and semivolatile organic compounds

01 ☐ G DRINKING WATER CONTAMINATION
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED 5 Persons (1.0)
04 NARRATIVE DESCRIPTION

A shallow aquifer potentially exists below the site. However, due to the buffer distance of approximately 1.0 miles to the nearest downgradient well, low annual precipitation (8 inches) the possibility is low.

01 ☐ H WORKER EXPOSURE/INJURY
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

None

01 ☐ I POPULATION EXPOSURE/INJURY
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______
04 NARRATIVE DESCRIPTION

None

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE: NM
02 SITE NUMBER: 2878-01-12

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None

01 ☐ K DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

None

01 ☐ L CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None

01 ☐ M UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE 10-22-87) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ________
04 NARRATIVE DESCRIPTION

Waste materials are poorly contained. No liners are present at the diposal pits.

01 ☐ N DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None

01 ☐ O CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None

01 ☒ P ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Based on EID reports and sample results, pits contain oily materials and acetone, toluene, methylene chloride.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

None

III. TOTAL POPULATION POTENTIALLY AFFECTED: Population within 1 mile radius greater than 100 persons

IV. COMMENTS

Conditions suggest surrounding population would not be affected.

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

*BLM Files
*Roy F. Weston Site Investigation Report

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION
01 STATE NM
02 SITE NUMBER 2878-01-12

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A NPDES				
☐ B UIC				
☐ C AIR				
☐ D RCRA				
☐ E RCRA INTERIM STATUS				
☐ F SPCC PLAN				
☐ G STATE (Specify)				
☐ H LOCAL (Specify)				
☒ I OTHER (Specify) BLM	lease	5-21-62	Unknown	Lease to San Juan County
☐ J NONE				

III. SITE DESCRIPTION

01 STORAGE DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☒ A SURFACE IMPOUNDMENT	35,000	yrd^3
☐ B PILES		
☐ C DRUMS, ABOVE GROUND		
☐ D TANK, ABOVE GROUND		
☐ E TANK, BELOW GROUND		
☒ F LANDFILL		
☐ G LANDFARM		
☐ H OPEN DUMP		
☐ I OTHER ________ (Specify)		

04 TREATMENT (Check all that apply)
- ☐ A INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C CHEMICAL/PHYSICAL
- ☐ D BIOLOGICAL
- ☐ E WASTE OIL PROCESSING
- ☐ F SOLVENT RECOVERY
- ☐ G OTHER RECYCLING/RECOVERY
- ☐ H. OTHER ________ (Specify)

05 OTHER
☐ A. BUILDINGS ON SITE
-

06 AREA OF SITE
40 (Ac

07 COMMENTS

Site is an active modified landfill containing two inactive septic pits

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☒ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC

The septic waste pit do not contain liners and were constructed within the soils at the site

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE ☐ YES ☒ NO

02 COMMENTS

The site is secured with a chain-link fence, guarded during operating hours, and the individual pits are fenced within the site.

VI. SOURCES OF INFORMATION (Cite specific references: e.g. state files, sample analysis, reports)

Roy F. Weston Site Investigation Report

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE NM
02 SITE NUMBER 2878-01-12

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

02 STATUS Unknown, but any affects are unlikely

03 DISTANCE TO SITE

	SURFACE	WELL	ENDANGERED	AFFECTED	MONITORED	
COMMUNITY	A. ☐	B. ☐	A. ☐	B. ☐	C. ☐	A. ______ (mi)
NON-COMMUNITY	C. ☐	D. ☒	D. ☐	E. ☐	F. ☐	B 1.0 (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING
☒ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available)
☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available)
☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 5

03 DISTANCE TO NEAREST DRINKING WATER WELL 2.5 (mi)

04 DEPTH TO GROUNDWATER 70 (ft)

05 DIRECTION OF GROUNDWATER FLOW Southwest

06 DEPTH TO AQUIFER OF CONCERN 70 (ft)

07 POTENTIAL YIELD OF AQUIFER NA (gpd)

08 SOLE SOURCE AQUIFER Unknown ☐ YES ☐ NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

Specific data unknown, 1 well located 1 mile south. Well depth is 70 feet.

10 RECHARGE AREA
☐ YES
☐ NO
COMMENTS Unknown

11 DISCHARGE AREA
☐ YES
☐ NO
COMMENTS Unknown

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☒ A. RESERVOIR, RECREATION DRINKING WATER SOURCE
☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES
☐ C. COMMERCIAL, INDUSTRIAL
☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME	AFFECTED	DISTANCE TO SITE
San Juan River	☐	5 (mi)
	☐	(mi)
	☐	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE A. 100 NO. OF PERSONS
TWO (2) MILES OF SITE B. >100 NO. OF PERSONS
THREE (3) MILES OF SITE C. 1000 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION Adjacent to site (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE 50-100

04 DISTANCE TO NEAREST OFF-SITE BUILDING Adjacent to site (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

Population increases south of site towards S.J. County Route 550. Residences are located adjacent to southern boundary of site.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NM	2878-01-12

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☒ B $10^{-4} - 10^{-6}$ cm/sec ☐ C $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A IMPERMEABLE (Less than 10^{-6} cm/sec) ☒ B RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☐ C RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK Greater than 40 feet (ft)

04 DEPTH OF CONTAMINATED SOIL ZONE 0 to 38 (ft)

05 SOIL pH

06 NET PRECIPITATION > -32 (in)

07 ONE YEAR 24 HOUR RAINFALL 1-2 (in)

08 SLOPE

SITE SLOPE 1-3 %

DIRECTION OF SITE SLOPE Southwest

TERRAIN AVERAGE SLOPE 0-8 %

09 FLOOD POTENTIAL WITHIN FLOODZONE

SITE IS IN ______ YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE A <1 (mi)

OTHER B. ______ (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

______ (mi)

ENDANGERED SPECIES: < 1

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL A 1 (mi)

RESIDENTIAL AREAS, NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES B 0 (mi)

AGRICULTURAL LANDS

PRIME AG LAND C ______ (mi)

AG LAND D. < 1 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The Kirtland Landfill is located in a gently sloping area adjacent to Stevens Arroyo. The northern boundary of the site increase slope dramaticly to the arroyo. The site elevation is approximately 5300 feet above MSL.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NM	2878-01-12

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER			
SURFACE WATER			
WASTE	2	Roy F. Weston, Stockton CA Lab	Available
AIR			
RUNOFF			
SPILL			
SOIL	16	Roy F. Weston, Stockton CA Lab	Available
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
Radiation Meter	No reading above background
HNU	Zero

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☐ GROUND ☐ AERIAL

02 IN CUSTODY OF Roy F. Weston/ Robert Mueller
(Name of organization or individual)

03 MAPS
☒ YES
☐ NO

04 LOCATION OF MAPS
Sketch maps of waste pits (Weston SI Report)

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

A soil gas survey was conducted to delineate the horizontal migration of contaminates from the waste pits. Survey was unable to produce any additional information on contaminate migration.

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION
01 STATE NM
02 SITE NUMBER 2878-01-12

II. CURRENT OWNER(S)

01 NAME Department of the Interior Bureau of Land Management
02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE

PARENT COMPANY (If applicable)

08 NAME
09 D+B NUMBER
10 STREET ADDRESS (P.O. Box, RFD #, etc.)
11 SIC CODE
12 CITY
13 STATE
14 ZIP CODE

08 NAME
09 D+B NUMBER
10 STREET ADDRESS (P.O. Box, RFD #, etc.)
11 SIC CODE
12 CITY
13 STATE
14 ZIP CODE

08 NAME
09 D+B NUMBER
10 STREET ADDRESS (P.O. Box, RFD #, etc.)
11 SIC CODE
12 CITY
13 STATE
14 ZIP CODE

08 NAME
09 D+B NUMBER
10 STREET ADDRESS (P.O. Box, RFD #, etc.)
11 SIC CODE
12 CITY
13 STATE
14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE

IV. REALTY OWNER(S) (If applicable; list most recent first)

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NM	2878-01-12

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME San Juan County Road Dept.
02 D+B NUMBER
03 STREET ADDRESS (P O Box, RFD #, etc.) 1900 W. Aztec Blvd.
04 SIC CODE
05 CITY Aztec
06 STATE NM
07 ZIP CODE 87410
08 YEARS OF OPERATION
09 NAME OF OWNER

OPERATOR'S PARENT COMPANY (If applicable)

10 NAME
11 D+B NUMBER
12 STREET ADDRESS (P O Box, RFD #, etc.)
13 SIC CODE
14 CITY
15 STATE
16 ZIP CODE

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P O Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE
08 YEARS OF OPERATION
09 NAME OF OWNER DURING THIS PERIOD

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P O Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE
08 YEARS OF OPERATION
09 NAME OF OWNER DURING THIS PERIOD

01 NAME
02 D+B NUMBER
03 STREET ADDRESS (P O Box, RFD #, etc.)
04 SIC CODE
05 CITY
06 STATE
07 ZIP CODE
08 YEARS OF OPERATION
09 NAME OF OWNER DURING THIS PERIOD

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

10 NAME
11 D+B NUMBER
12 STREET ADDRESS (P O Box, RFD #, etc.)
13 SIC CODE
14 CITY
15 STATE
16 ZIP CODE

10 NAME
11 D+B NUMBER
12 STREET ADDRESS (P O Box, RFD #, etc.)
13 SIC CODE
14 CITY
15 STATE
16 ZIP CODE

10 NAME
11 D+B NUMBER
12 STREET ADDRESS (P O Box, RFD #, etc.)
13 SIC CODE
14 CITY
15 STATE
16 ZIP CODE

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NM	2878-01-12

II. ON-SITE GENERATOR

01 NAME NA		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME Unidentified		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME Unidentified		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NM	2878-01-12

II. PAST RESPONSE ACTIVITIES

01 ☐ A WATER SUPPLY CLOSED 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ B TEMPORARY WATER SUPPLY PROVIDED 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ C PERMANENT WATER SUPPLY PROVIDED 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ D SPILLED MATERIAL REMOVED 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ E CONTAMINATED SOIL REMOVED 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ F WASTE REPACKAGED 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ G WASTE DISPOSED ELSEWHERE 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ H ON SITE BURIAL 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ I IN SITU CHEMICAL TREATMENT 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ J IN SITU BIOLOGICAL TREATMENT 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ K IN SITU PHYSICAL TREATMENT 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ L ENCAPSULATION 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ M EMERGENCY WASTE TREATMENT 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ N CUTOFF WALLS 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ O EMERGENCY DIKING/SURFACE WATER DIVERSION 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ P CUTOFF TRENCHES/SUMP 02 DATE 03 AGENCY
04 DESCRIPTION
None

01 ☐ Q SUBSURFACE CUTOFF WALL 02 DATE 03 AGENCY
04 DESCRIPTION
None

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NM	2878-01-12

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R BARRIER WALLS CONSTRUCTED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

01 ☐ S CAPPING/COVERING 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

01 ☐ T BULK TANKAGE REPAIRED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

01 ☐ U GROUT CURTAIN CONSTRUCTED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

01 ☐ V BOTTOM SEALED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

01 ☐ W GAS CONTROL 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

01 ☐ X FIRE CONTROL 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

01 ☐ Y LEACHATE TREATMENT 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

01 ☐ Z AREA EVACUATED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

01 ☒ 1 ACCESS TO SITE RESTRICTED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION Site is fenced, waste pits are also individually fenced

01 ☐ 2 POPULATION RELOCATED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

01 ☐ 3 OTHER REMEDIAL ACTIVITIES 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Roy F. Weston Site Investigation Report

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION

01 STATE NM

02 SITE NUMBER 2878-01-12

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY ENFORCEMENT ACTION ☐ YES ☐ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY ENFORCEMENT ACTION

III. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

APPENDIX E

HRS DATA SHEET

Facility name: Kirtland Landfill

Location: Kirtland, New Mexico

EPA Region: 6

Person(s) in charge of the facility: Chuck Pettee---BLM

San Juan County Road Department

Name of Reviewer: Robert Mueller **Date:** 1-28-88

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of th facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

The site is an active modified landfill operated by San Juan County. Two Unlined septic waste pits that contain hazardous substances are located at the landfill. The site is located at the intersection of San Juan County Route 6500 at 6480, 13 miles West of Farmington, NM

Scores: $S_M = 6.30$ ($S_{gw} = 10.05$ $S_{sw} = 4.20$ $S_a = 0$)

$S_{FE} = 0$

$S_{DC} = 0$

Ground Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	(S
1 Observed Release	[✓ 0] 45	1	0	45	
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					
Depth to Aquifer of Concern	0 1 [✓ 2] 3	2	4	6	
Net Precipitation	[✓ 0] 1 2 3	1	0	3	
Permeability of the Unsaturated Zone	0 [✓ 1] 2 3	1	1	3	
Physical State	0 1 2 [✓ 3]	1	3	3	
	Total Route Characteristics Score		8	15	
3 Containment	0 1 2 [✓ 3]	1	3	3	3
4 Waste Characteristics					3
Toxicity/Persistence	0 3 6 9 [✓ 12] 15 18	1	12	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 [✓ 8]	1	8	8	
	Total Waste Characteristics Score		20	26	
5 Targets					3.
Ground Water Use	0 1 [✓ 2] 3	3	6	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	6	40	
	Total Targets Score		17	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5 8 · 3 20 10			5760	57,330	
7 Divide line 6 by 57,330 and multiply by 100	S_{gw} = 10.05				

Surface Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score
1 Observed Release	[✓ 0] 45	1	0	45
If observed release is given a value of 45, proceed to line **4**. If observed release is given a value of 0, proceed to line **2**.				
2 Route Characteristics				
Facility Slope and Intervening Terrain	0 [✓ 1] 2 3	1	1	3
1-yr. 24-hr. Rainfall	0 [✓ 1] 2 3	1	1	3
Distance to Nearest Surface Water	[✓ 0] 1 2 3	2	0	6
Physical State	0 1 2 [✓ 3]	1	3	3
Total Route Characteristics Score			5	15
3 Containment	0 1 2 [✓ 3]	1	3	3
4 Waste Characteristics				
Toxicity/Persistence	0 3 6 9 [✓ 12] 15 18	1	12	18
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 [✓ 8]	1	8	8
Total Waste Characteristics Score			20	26
5 Targets				
Surface Water Use	0 1 2 [✓ 3]	3	9	9
Distance to a Sensitive Environment	[✓ 0] 1 2 3	2	0	6
Population Served/Distance to Water Intake Downstream	[✓ 0] 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40
Total Targets Score			9	55
6 If line **1** is 45, multiply **1** x **4** x **5** If line **1** is 0, multiply **2** x **3** x **4** x **5**			2,700	64,350

5 3 20 9

7 Divide line **6** by 64,350 and multiply by 100 S_{sw} = 4.20

Air Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multi- plier	Score	Max. Score	Re (Sec
$\boxed{1}$ Observed Release	[✓ 0] 45	1	0	45	5.
Date and Location:					
Sampling Protocol:					
If line $\boxed{1}$ is 0, the S_a = 0. Enter on line $\boxed{5}$. If line $\boxed{1}$ is 45, then proceed to line $\boxed{2}$.					
$\boxed{2}$ Waste Characteristics					5 2
Reactivity and Incompatibility	[✓ 0] 1 2 3	1	0	3	
Toxicity	0 1 [✓ 2] 3	3	6	9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 [✓ 8]	1	8	8	
	Total Waste Characteristics Score		14	20	
$\boxed{3}$ Targets					5 3
Population Within 4-Mile Radius	0 9 12 15 [✓ 18] 21 24 27 30	1	18	30	
Distance to Sensitive Environment	[✓ 0] 1 2 3	2	0	6	
Land Use	0 1 2 [✓ 3]	1	3	3	
	Total Targets Score		21	39	
$\boxed{4}$ Multiply $\boxed{1}$ x $\boxed{2}$ x $\boxed{3}$				35,100	
$\boxed{5}$ Divide line $\boxed{4}$ by 35,100 and multiply by 100		S_a =	0		

	S	S^2
Groundwater Route Score (S_{gw})	10.05	101
Surface Water Route Score (S_{sw})	4.20	17.64
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$	▨	87.70
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$	▨	10.89
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$	▨	6.30

WORKSHEET FOR COMPUTING S_M

Direct Contact Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	R (Se
1 Observed Incident	0 45	1		45	8
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	[✓ 0] 1 2 3	1	0	3	8
3 Containment	0 15	1	15	15	8
4 Waste Characteristics Toxicity	0 1 [✓ 2] 3	5	10	15	8
5 Targets					8
Population Within a 1-Mile Radius	0 1 [✓ 2] 3 4 5	4	8	20	
Distance to a Critical Habitat	[✓ 0] 1 2 3	4	0	12	
	Total Targets Score		8	32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5 0 15 10 8			0	21,600	
7 Divide line 6 by 21,600 and multiply by 100		S_{DC} =	0		

Fire and Explosion Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Re (Sect
1 Containment	1 3	1		3	7.
2 Waste Characteristics					7.
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
3 Targets					7 3
Distance to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
	Total Targets Score			24	
4 Multiply 1 x 2 x 3				1,440	
5 Divide line 4 by 1,440 and multiply by 100		S_{FE} =			

EPNG-SJR

PRELIMINARY ASSESSMENT (PA) REPORT

FOR

KIRTLAND SITE
FARMINGTON, SAN JUAN COUNTY, NEW MEXICO

BLM Site Code: NM 0000000000
AEPCO Site No. 2 Group A

(FINAL REPORT)

Under BLM Contract No. AA852-CT5-26
AEPCO Project No. 1200.1722

AEPCO, INC

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PRELIMINARY ASSESSMENT (PA) REPORT

FOR

KIRTLAND SITE
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BLM Site Code: NM 0000000000
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AEPCO Project No. 1200.1722

Submitted to:

Department of the Interior
Bureau of Land Management (BLM)
18th and C Streets, N.W.
Washington, D.C. 20240

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11 August 1986

EXECUTIVE SUMMARY

A preliminary assessment (PA) was performed at the Kirtland Site with the objectives of using available information as supplemented by a site reconnaissance and a field sampling and laboratory analysis program to:

- Define the type and estimate the quantities of hazardous materials/wastes on site;
- Estimate the status of contamination migration; and
- Classify the site for possible future site actions.

A. Site Location, History and Layout

The site is located near Farmington, New Mexico, and is under the jurisdiction of the BLM Farmington Resource Area. A total of approximately 40 acres has been leased by the BLM to San Juan County to operate a modified sanitary landfill for over twenty years.

Visual observations indicate that wastes, not necessarily all hazardous, have been deposited in an inactive old dump pit, a new septic waste pit, a new landfill trench, and a dead animal pit. Laboratory analysis results for onsite waste samples suggest that oil and gas industrial sludges have been illegally disposed at the site. The sludge in the old dump pit appeared to be dry, and was light brown in color with red patches.

The site entrance contains a cattleguard and warning signs, but no gates. Other than fencing and natural terrain barriers, no other access control mechanisms are in place.

An El Paso Natural Gas Company plant is located about 0.3 miles southwest of the site. The plant property contains a large unlined pond system, which might be used to hold industrial discharges. During the area reconnaissance, the pond water was observed to be deep red or discolored. Whether the pond system is a potential offsite source of contamination cannot be determined due to the lack of information regarding its exact contents. The pond system is located at approximately the same elevation as the site and may potentially play a role in regulating shallow or deeper groundwater aquifer flows, if any. The extent of groundwater elevation and flow modification by this pond system is currently unknown.

B. Features of the Site and Vicinity

The general area of the site, especially near river beds, consists of an outwash of gravels and sands; and is underlain by a shallow "alluvial gravel fill aquifer" that is highly vulnerable to contamination from surface discharges and leachates from surface/subsurface contamination. In the general area of the site, the groundwater most likely flows westward along the Stevens Arroyo. Bedrock in the region is fractured; and as a result intercommunication between the shallow unconsolidated and the bedrock aquifers may exist.

Most of the surface soils are shallow, highly permeable, and coarse in texture with small amounts of silts and clay. Because of prior soil excavation activities for the landfill, soils on site have been disturbed to a depth of 5 to 7 feet. No definite clay layer was noticed at these depths. Because of their high permeability, the onsite soils are highly susceptible to contamination by hazardous liquid and solid wastes.

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D. BLM Site Classification

The Kirtland Site is classified as a BLM Class III site, because it contains hazardous wastes or other hazardous substances in such form and quantity and under such conditions that there is specific reason to believe that a potentially significant hazard to human health or the environment may exist and that further definitive investigations must be undertaken.

E. Recommendations

Initial remedial measures (IRMs) recommended to minimize potential exposure to onsite wastes and contaminated soils and prevent further complication of the site problem are:

- o Establishment of effective site access control mechanisms such as placement of a security gate at the site entrance and implementation of a permit system to regulate waste disposers; and

- o Improvements to the northern dike at the old waste pit to minimize the erosion potential and reduce the chance of offsite transport of waste materials via the surface water route;

Installation of new monitoring wells on and off the site is recommended to determine the hydrogeologic characteristics and groundwater quality at the site. The exact number of monitoring wells needed will be determined during the preparation of the work plan for this followup investigation. In addition, collection of well water samples from selected residential wells would assist in the determination of the extent of offsite contaminant migration, if any. Although, residential wells, if any, near the site are expected to be located side-gradient from the site, the potential of residential well contamination still exists if the depression cones created by these wells have extensively overlapped with the potentially contaminated groundwater plume(s).

Surface water/sediment sampling downgradient from the site would remedy data gaps to gain better understanding of the site contamination and contaminant migration problems via the surface water route.

Because of the potential multiple contamination sources (both onsite and offsite) in the study area appropriate EPA, BLM, State of New Mexico, and San Juan County authorities and affected parties should be called upon to cooperatively undertake the followup investigations.

The site and vicinity contain nearly level to gently sloping terrain (3-5%). Surface runoff from the site is normally scarce, because the annual precipitation only averages approximately 7 inches. However, during intensive rainstorms, surface runoff from the site can be significant. Runoff from the site drains into the Stevens Arroyo, thence flows westwards, and eventually empties into the San Juan River.

C. Contamination Concerns

The site contains an estimated 11,000 cubic yards of liquid, semi-solid, and solid wastes, not necessarily all hazardous. Field evidence and laboratory results for onsite waste samples reveal that unauthorized and illegal dumping of petroleum industrial or other hazardous wastes has occurred on the site. No records were kept of the volumes of wastes dumped nor the exact dates on which they were dumped. In general, the wastes are considered noncorrosive, highly volatile, and nonreactive. Some of the substances in the wastes are considered toxic.

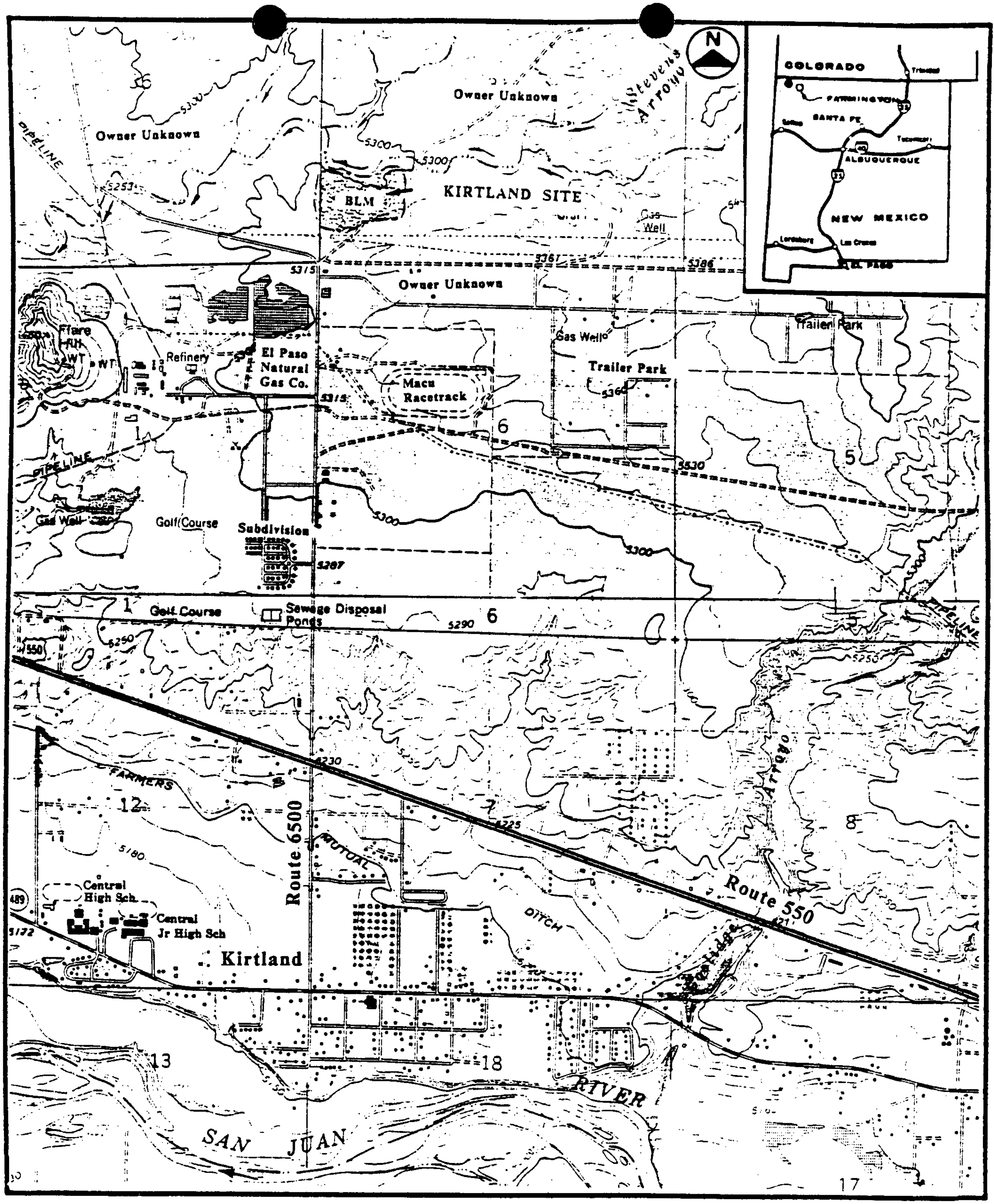
The ananlytical findings from the composite waste sampling indicate that the wastes contain elevated concentrations of highly volatile and mobile benzene and total xylenes. A grab surface water/liquid waste sample collected from the septic waste pit revealed elevated concentrations of chromium, copper, manganese, and lead. The liquid medium also contained toluene, phenol, 1,4-dichlorobenzene, and benzyl alcohol.

Most of the residents in the area are served by a public water system managed by the Lower Valley Water Users Association. A field reconnaissance of the immediate site vicinity revealed that there are approximately 60 housing units within a 1 mile radius of the site. The site is visited by a transient population, including site workers, waste disposers, scavengers, and occasional trespassers and visitors. The permanent and transient population is estimated to amount to approximately 230 and 50 individuals, respectively.

Land users who might be affected by releases of hazardous substances on or from the site are 1) neighboring residents; 2) transient onsite workers, waste disposers, scavenger, and occasional site trespassers and visitors; and 3) a few users, if any, who still rely on the groundwater aquifer(s) as a water supply source for drinking and other domestic purposes.

Particular environmental and health concerns are the (1) uncontrolled release of wastes via erosion of a containment dike into a nearby ditch, thence to Stevens Arroyo, and subsequently to San Juan River; (2) leaching of hazardous substances into the shallow unconsolidated aquifer, if present beneath the site, and possibly the bedrock aquifer at the site; and (3) offsite migration of contaminants via groundwater.

Whether the groundwater under near the site is contaminated cannot currently be assessed, due to the lack of a groundwater monitoring program for the area. However, based on the estimated westward groundwater flow, existing wells, if present, would be closely located to and sidegradient from the site. They may be threatened by the site contamination, if the depression cones created by these individual wells have significantly overlapped with the potentially contaminated groundwater plume(s).



SOURCE: USGS QUADRANGLE MAP

Youngs Lake, N.M. (7.5-Minute Series Quadrangle Map)

0 2000 4000 FEET

FIGURE 1-1.
LOCATION MAP OF KIRTLAND SITE, FARMINGTON, SAN JUAN COUNTY, N.M.

1.0 BACKGROUND

This Preliminary Assessment (PA) report has been prepared in accordance with:

- the requirements in the Project Guidance Documents prepared by AEPCO, Inc. for the Bureau of Land Management (BLM);
- Section 105 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980;
- the National Contingency Plan (NCP) (Federal Register Vol. 47, No. 137, July 16, 1982); and
- the Federal Facilities Program Manual for Implementing CERCLA Responsibilities for Federal Agencies prepared by the U.S. Environmental Protection Agency.

1.1 Scope of Services

A Preliminary Assessment (PA) was performed at the Kirtland Site by AEPCO, Inc. under a contract agreement with the BLM. The objectives of this PA are to:

- Define the type and estimate the quantities of hazardous materials or wastes on site;
- Estimate the status of contamination migration,
- Determine the extent to which the site is in compliance with Federal and State regulations or permits; and
- Facilitate site classification for subsequent actions including no action.

This PA report will be the basis for a scoping decision to be made by BLM for requesting funding for follow-up site investigation, remedial investigation, feasibility studies, and whatever onsite or offsite remedial actions are required.

This report has been prepared exclusively from existing information supplemented by a site reconnaissance and a field sampling and laboratory analysis program.

1.2 Site Location and Layout

The site is near Kirtland, approximately 13 miles west of Farmington, San Juan County, New Mexico. It is located on the USGS Youngs Lake, New Mexico, 7.5-minute quadrangle map at 36°46'00" N latitude 108°21'15" W longitude (**Figure 1-1**). Consisting of about 40 acres in T30N, R14W, Lot 4, Section 31, the site is located about 0.3 mile northeast of the El Paso Natural Gas Company (EPNG), San Juan River Plant, a refinery, or about less than 0.2 mile from the intersection of San Juan County Routes 6500 and 6480 (**Figures 1-1 and 1-2**). The landfill operation extends to the southern portion of the site between two powerlines (115 kv powerline) owned and operated by the Public Service Company of New Mexico, Farmington, New Mexico. The site is under the jurisdiction of the Farmington Resource Area (FRA), Albuquerque District, BLM New Mexico State Office, Santa Fe, New Mexico.

San Juan County is in the northwestern part of New Mexico. The County is bordered on the north by the State of Colorado, on the east by Rio Arriba and Sandoval Counties, on the south by McKinley County, and on the west by the State of Arizona. Aztec, the county seat, is on the Animas River and in the northeastern part of the county. The area is home to the Jicarilla Apache, Laguna, Navajo, and Ute mountain indians. San Juan County is also the site of major oil and gas fields. The Navajo Mine and Four Corners power plant west of Farmington constitute the world's largest contiguous coal mine and electric power-generating complex. The Grants uranium region, spanning the southern edge of the San Juan basin, has generally led the nation in uranium production since the early 1950's.

Visual observations and laboratory analysis results for wastes collected during this PA indicate that wastes, not necessarily all hazardous, have been deposited in an inactive old dump pit on the northcentral border; in a new septic tank waste pit (75'x200') to the southwestern end; and in a new landfill trench (75'x400') and a dead animal pit (25'x50') close to the southcentral border of the site. Apparently, petroleum industrial wastes, other hazardous wastes or still bottoms were illegally deposited in the old dump pit and the new septic tank waste pit. The sludge in the old dump pit appeared to be dry, and was light brown in color with red patches.

The site entrance is located on the southern part of the fenced site. The entrance contains a cattleguard and warning signs, but no gates. Other than the fencing and natural terrain barriers, no other access control mechanisms are in place.

1.3 Site Description

1.3.1 Topography

The eastern part of San Juan County is on a high plateau that is dissected in the north by the San Juan River Valley. Farmington and vicinity consist of plateaus and deep valleys formed as a result of distant hills and mountains. Local relief is low.

The site and vicinity feature nearly level to gently sloping terrain (approximately 3-5%) consisting of shallow soils, well drained, formed in alluvial and eolian materials on uplands with intermittent rock outcrop. The site is located approximately 5,300 ft to 5,320 ft above mean sea level.

1.3.2 Soils

A general soil map prepared by the U.S. Soil Conservation Service for the eastern part of San Juan County, New Mexico (USDA/SCS, 1980) shows a spatial distribution of various soil associations -- a landscape having a proportional pattern of one or more major soils and at least one minor soil. The soils in one association may occur in another but in a different pattern. Several of the soil associations identified in the eastern part of the San Juan County general soil map are present at the site and its vicinity. However, the descriptions, names, and delineations of soils in the soil survey of the County do not fully agree with those on soil maps for adjacent counties. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, or the extent of soils within the survey area. (op. cit.).

Engineering indices and physical and chemical properties of these soils are presented in Tables 1-1 and 1-2, respectively. The soils at the site vary from very shallow to deep, nearly level, well drained, formed in alluvial, residual, and eolian materials on uplands.

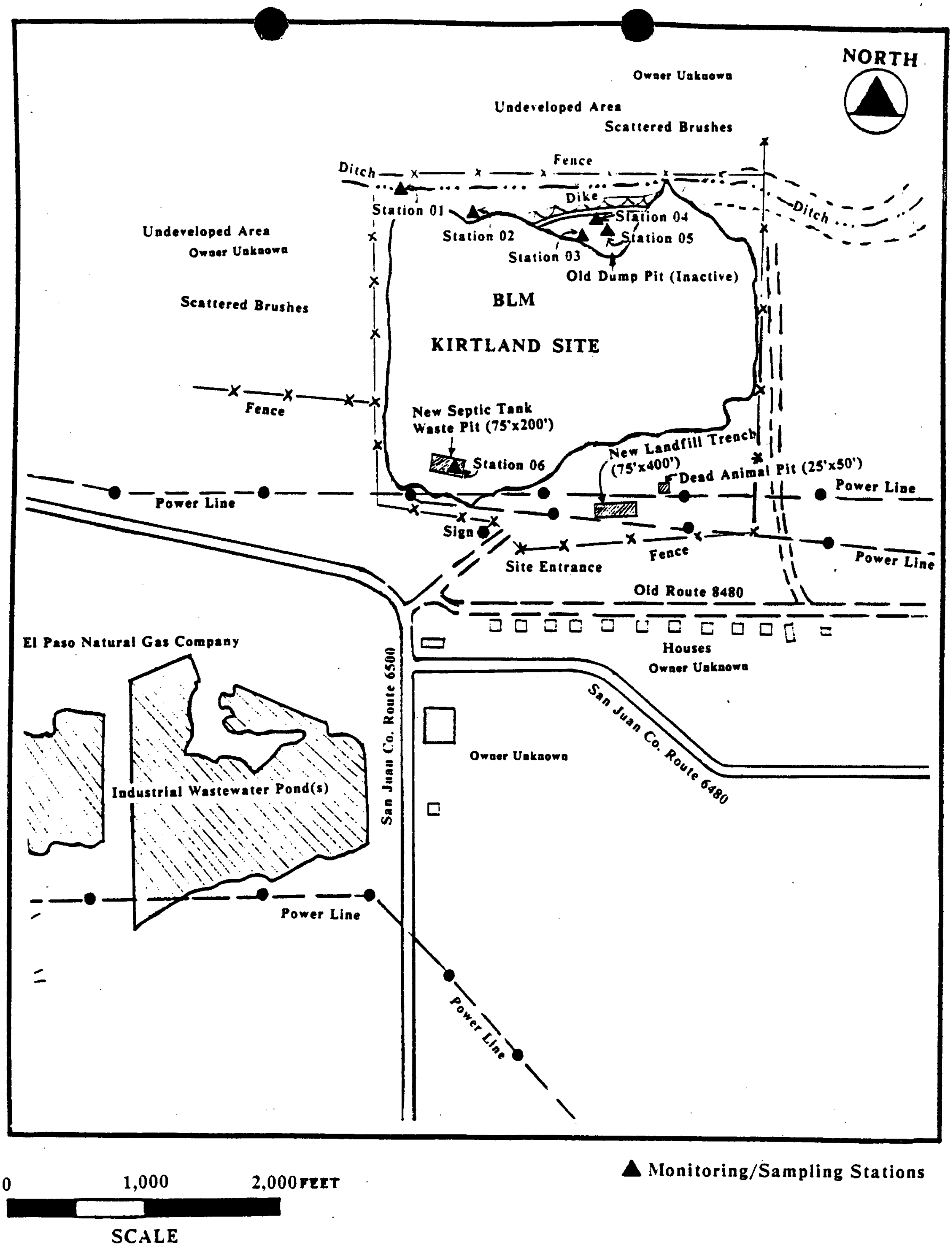


FIGURE 1-2. KIRTLAND SITE LAYOUT

TABLE 1-2. PHYSICAL AND CHEMICAL PROPERTIES OF SOILS AT AND NEAR THE SITE

PROPERTIES OF SOILS AT AND IN THE VICINITY OF THE SUBJECT SITE
SITE NAME: KIRTLAND SITE SITE CODE: 2
CITY: FARMINGTON GROUP NO.: A
COUNTY: SAN JUAN COUNTY BLM CODE: NM 0000000000
STATE: NEW MEXICO
BLM HAZARDOUS MATERIALS MANAGEMENT PROJECT
REV. DATE: 06 NOVEMBER 1985

SOIL NAME	DEPTH (Inch)	CLAY <2mm (%)	PERMEABILITY (Inch/Hr)	SOIL REACTION (pH)	SALINITY (Mmhos/cm)	SHRINK-SWELL POTENTIAL	ORGANIC MATTER (%)
Avalon (Av)	0-14	12-17	2.0-6.0	7.9-8.4	2-8	Low	0.5-0.8
	14-53	20-30	0.6-2.0	7.9-8.4	2-8	Low	----
	53-72	15-25	2.0-6.0	7.9-8.4	2-8	Low	----
Monierco	0-2	10-15	2.0-6.0	7.4-8.4	< 2	Low	----
	2-14	16-35	0.2-0.6	7.4-9.0	< 2	Moderate	----
	14	----	----	----	----	----	----
Persayo (BC)	0-2	27-35	0.2-0.6	7.9-9.0	< 8	Moderate	0.5-1.0
	2-12	27-35	0.2-0.6	7.9-9.0	< 8	Moderate	----
	12	----	----	----	----	----	----
Blancot	0-2	15-26	0.2-2.0	7.9-8.4	< 2	Low	----
	2-60	20-35	0.6-2.0	7.9-9.0	< 4	----	----
Notal (BT)	0-3	28-35	0.2-0.6	7.9-9.0	4-8	Moderate	----
	3-60	40-50	< 0.06	7.9-9.0	4-8	High	----
Doak	0-3	15-27	0.6-2.0	7.4-8.4	< 2	Low	0.5-0.6
	3-60	25-35	0.2-0.6	7.4-9.0	2-4	Moderate	----
Sheppard (DS)	0-3	5-10	6.0-20	7.9-8.4	< 2	Low	----
	3-60	5-10	6.0-20	7.9-8.4	< 2	Low	----
Shiprock	0-3	10-20	2.0-6.0	7.4-8.4	< 2	Low	0.5-0.6
	3-60	10-18	2.0-6.0	7.4-9.0	< 2	Low	----
Farb	0-7	15-20	2.0-6.0	7.4-8.4	< 2	Low	----
	7-10	10-20	2.0-6.0	7.4-8.4	< 2	Low	----
	10	----	----	----	----	----	----
Persayo (FA)	0-2	28-35	0.2-0.6	7.9-9.0	< 8	Moderate	0.5-1.0
	2-15	28-35	0.2-0.6	7.9-9.0	< 8	Moderate	----
	15	----	----	----	----	----	----
Fruitland	0-4	5-10	2.0-6.0	7.4-8.4	< 4	Low	0.6-0.8
	4-60	5-18	2.0-6.0	7.4-8.4	< 4	Low	----
Persayo (FX)	0-2	28-35	0.2-0.6	7.9-9.0	< 8	Moderate	0.5-1.0
	2-18	18-35	0.2-0.6	7.9-9.0	< 8	Moderate	----
	18	----	----	----	----	----	----
Sheppard (FX)	0-4	5-10	6.0-20	7.9-8.4	< 2	Low	----
	4-60	5-10	6.0-20	7.9-8.4	< 2	Low	----
Blackston	0-11	18-27	2.0-6.0	7.9-8.4	2-4	Low	----
	11-28	15-30	0.2-0.6	8.5-9.0	< 2	Low	----
	28-60	5-15	6.0-20	7.9-8.4	< 2	Low	----
Stumble	0-3	0-10	6.0-20	7.9-8.4	< 2	Low	----
	3-60	0-10	6.0-20	7.9-9.0	< 4	Low	----
Notal (SX)	0-24	28-35	0.2-0.6	7.9-9.0	4-8	Moderate	----
	24-60	40-50	< 0.06	7.9-9.0	4-8	High	----

---- : Not estimated
Source: Department of Agriculture/Soil Conservation Service, 1980.
Soil Survey of San Juan County, New Mexico. Eastern Part.

TABLE 1-1. ENGINEERING INDICES OF SOILS AT AND NEAR THE SITE

SITE NAME:	Kirtland Site	SITE CODE:	2
CITY:	Farmington	GROUP NO.:	A
COUNTY:	San Juan	BLM CODE:	NM 000000000
STATE:	New Mexico		

SOIL NAME	DEPTH (INCH)	USDA TEXTURE	UNIFIED CLASSI-FICATION	PERCENT OF FRAGMENTS >3 INCHES	PERCENTAGE PASSING SIEVE				LIQUID LIMIT (L.L.) (%)	PLASTICITY INDEX (P.I.)*
					#4	#10	#40	#200		
Avalon (Av)	0-14	Sandy loam	SM	0	100	90-100	60-80	35-50	15-25	NP-5
	14-53	Loam, sandy clay loam, clay loam	CL-ML, CL	0	85-95	80-90	65-85	50-70	20-35	5-15
	53-72	Gravelly sandy loam, gravelly loam, gravelly sandy clay loam	SM SM-SC GM GM-GC	0	55-75	50-70	35-60	25-40	15-25	NP-10
Monierco	0-2	Fine sandy loam	SM	0	100	100	60-82	30-50	15-25	SP-5
	2-14	Sandy clay loam, clay loam, loam,	CL,CL-ML	0	100	100	80-100	50-80	20-35	5-15
	14	Weathered bedrock								
Persayo (BC)	0-2	Clay loam,	CL	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	2-12	Clay loam, silty Clay loam	CL	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	12	Weathered bedrock								
Blancot	0-2	Loam	CL-ML	0	100	100	75-95	50-80	25-35	5-10
	2-60	Clay loam, sandy Clay loam	CL-ML,CL	0	100	100	80-100	50-80	25-40	5-20
Notal (BT)	0-3	Silty clay loam	ML	0	100	100	90-100	70-80	35-45	10-20
	3-60	Silty clay, clay	CL, CL-ML	0	100	100	90-100	80-95	40-60	15-30
Doak	0-3	Loam	ML	0	100	100	80-95	60-75	20-30	NP-5
	3-60	Clay loam, silty clay loam, loam.	CL, CL-ML	0	100	100	80-100	60-80	25-40	5-20
Sheppard (DS)	0-3	Loamy fine sand	SM	0	100	100	80-95	60-75	20-30	NP-5
	3-60	Loamy fine sand Loamy sand, fine sand.	SM	0	100	100	65-85	15-30	15-30	NP-5
Shiprock	0-3	Fine sandy loam	SM, SM-SC	0	100	100	75-90	30-50	20-30	NP-10
	3-60	Sandy loam, fine Sandy loam.	SM, SM-SC	0	100	100	75-90	30-50	20-30	NP-10
Farb	0-7	Fine sandy loam	SM	0	100	100	65-80	35-50	15-25	NP-5
	7-10	Loamy sand, sandy loam, fine sandy loam.	Sm	0	100	100	65-80	35-50	20-25	NP-5
	10	Unweathered bedrock								
Persayo (FA)	0-2	Clay loam	CL	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	2-15	Clay loam, silty clay loam	CL	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	15	Weathered bedrock								
Fruitland	0-6	Sandy loam	SM	0	100	100	60-75	30-45	15-25	NP-5
	6-60	Fine sandy loam sandy loam.	SM	0	100	100	60-75	30-50	15-25	NP-5
Persayo (FX)	0-2	Clay loam	CL	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	2-18	Clay loam, silty clay loam	CL	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	18	Weathered bedrock.								
Sheppard (FX)	0-4	Loamy fine sand	SM	0	100	100	65-85	15-30	15-20	NP-5
	4-60	Loamy fine sand, loamy sand, fine sand	SM	0	100	100	65-85	15-30	15-20	NP-5
Blackston	0-11	Gravelly loam	SM, SM-SC	0-5	70-90	60-80	45-70	25-50	20-30	NP-10
	11-28	Very gravelly sandy loam, very gravelly loam, very gravelly clay loam.	GM, GM-GC	35-55	20-50	15-40	10-30	5-25	20-30	NP-10
	28-60	Very gravelly sand, very gravelly sandy loam.	GP	35-55	15-45	10-40	5-20	0-5		NP
Stumble	0-3	Loamy sand	SM	0	100	100	50-75	15-25	15-20	NP-5
	3-60	Loamy coarse sand, loamy sand, sand.	SM, SP-SM	0	100	100	40-75	5-25	15-20	NP-5
Notal (SX)	0-24	Clay loam	CL, ML	0	100	100	90-100	70-80	35-45	10-20
	24-60	Silty clay, clay	CL, CH	0	100	100	90-100	80-95	40-60	15-30

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* NP = Nonplastic

Source: Department of Agriculture/Soil Conservation Service, 1980.
Soil Survey of San Juan County, New Mexico. Eastern Part.

Geology of the Site and Vicinity

The Farmington area of San Juan County consists of plateaus and deep valleys of Cretaceous/Tertiary formations, i.e., belonging to or relating to the last period of the Mesazoic era or corresponding system of rocks. The bedrock geology comprises of low dipping (relief) sandstones and shales. The general area of the site, especially near the river beds, consists of an outwash of gravels and sands. Rock outcrops are prevalent in some locations at and near the site (Wells, 1985; and Gorham, et al., 1977). The bedrock is fractured (Wells, 1985). The rocks exposed in the field area in the region are upper Cretaceous formations, which consist of the Cliff House Sandstone (uppermost unit of the Mesa Verde Group) and a normal sequence of younger Cretaceous beds culminating with the Fruitland Formation (Gorham, et al., 1977).

1.3.4 Hydrogeology

The general study area of the site is in an outwash of gravels and sands. Bedrock outcrops in some areas. The uppermost aquifer, the "alluvial gravel valley aquifer", occurs at approximately 30 to 40 feet depth near river beds in this region (Wells, 1985). At these depths, there appears to be fill material and unconsolidated outwash of gravels and sands.

New Mexico contains dozens of geologic formations which are potential fresh-water aquifers (Wilson, 1981). One of the basic fresh-water aquifers that may be associated with the general area of the site appears to belong to the Quaternary age. This aquifer consists of an alluvium (40-80 feet thick) with unconsolidated sands, gravels, silts, and clays (Wilson, 1981; and Stone, et al., 1983), i.e., an alluvial valley aquifer (Wells, 1985).

Typical hydrogeologic properties of alluvial valley aquifers as compiled by Wilson (1981) are shown in **Table 1-3**. Although they are only applicable on a regional basis and not be a specific locale, the values do provide a general guide as to the potential for aquifer contamination and contaminant migration.

Based on the distribution of aquifers in the State of New Mexico and vadoze-zone characteristics, Wilson (1981) constructed a map of aquifers vulnerable to pollution. In accordance with the map, the general area of the site appears to be within a shallow aquifer zone that is highly vulnerable to contamination from surface discharges and leachates from surface/subsurface contamination.

The alluvial valley-fill aquifer water table is shallow (30 to 40 feet) near river beds with no apparent impervious layer for protection. The regional groundwater movement throughout the State follows river valleys. In all cases, the regional groundwater flows from upland recharge areas (e.g., San Juan Mountain areas) towards natural discharge zones (e.g., the San Juan River). Local flow conditions are dictated by the size of associated recharge zones and the hydraulic gradient between the recharge zones and the discharge areas.

The local topography at and near the site indicates that the shallow groundwater aquifer, if present, probably flows westward along Stevens Arroyo.

Bedrock in the region is fractured (Gorham, et al., 1977), hence intercommunication between the shallow unconsolidated and the bedrock aquifers may exist (Wells, 1985).

Most of the surface soils are shallow, varying in depth from 12" to 72" and coarse in texture with small amounts of silts and clay (15-20%) and with low shrink-swell potential. The surface soils are low in organic matter (0-1%), alkaline in reaction (pH of approximately 8.0), and permeable (2.0-6.0 in/hr).

Because of prior soil excavation activities for landfill purposes, soils on site have been disturbed down to 5-7 feet. No definite clay layer was noticed at these depths. The exact extent of clay layer, if any, and its depth is unknown.

Because of their high permeability, the onsite soils are highly susceptible to contamination by hazardous liquid and solid wastes dumped in the inactive old dump pit, in the new septic tank waste pit on site, and industrial wastes potentially deposited in other offsite sources near the site (e.g., in the El Paso Natural Gas Co.'s industrial storage pond system about 1,600 feet southwest of the site).

1.3.3 Geology

Regional Geology

Stone, et al. (1983) reported that San Juan County occupies the Navajo Section of the Colorado Plateau physiographic province. The region is a structural depression containing deep Tertiary fill resting on rocks of Late Cretaceous age. Quaternary deposits are restricted mainly to major valleys. (op. cit.).

The study area has three distinct geomorphic units. The first unit is in the northern and eastern parts of the County and is characterized by high relief, stepped topography, upland summits, narrow valleys, and steep canyon walls. Surface deposits on uplands consist of thin veneers of eolian sediment in some areas and of gravelly alluvium in others. In many areas, bedrock crops out at the surface. Resistant sandstone beds of the early Tertiary San Jose Formation form prominent structural benches, buttes, and mesas bounded by cliffs. Elevation ranges from 6,400 to 7,200 feet above mean sea level. (op. cit.).

The second unit consists of the alluvial fans and flood plains in the entrenched, narrow valleys of the San Juan, Animas, and La Plata Rivers. There are several smaller ephemeral stream systems and high, level terraces and terrace gravels that form a stepped sequence of river cut benches at elevations of as much as 600 feet above the present floodplain. Elevation ranges from 4,800 to 6,000 feet above mean sea level. The unit crosses parts of the other two units. (op. cit.).

The third unit is the largest of the three. It is bounded on the north and east by the first geomorphic unit and is dissected by the second one. This unit is characterized by moderate canyon dissection; relatively broad valleys; broad, gently sloping plateaus and mesas; locally thick deposits of alluvium; and sandy eolian sediment. Except for local areas underlain by cliff-forming Ojo Alamo and Pictured Cliff Sandstone of Late Cretaceous age, the relatively smooth and gently sloping topography of the plateaus reflects the erodibility of generally shaly bedrock such as that of the Kirtland and Nacimiento Formations of Cretaceous to early Tertiary age. Elevation ranges from 5,600 to 6,400 feet above mean sea level. (op. cit.).

1.3.5 Water Supply

The New Mexico Environmental Improvement Division (N.M. EID, 1986) reports that the area population is served by the public water supply system managed by the Lower Valley Water Users Association. This population includes about 60 houses (230 persons) within a 1 mile radius of the site. The N.M. EID is not aware of the presence of any individual residential wells near the site. A comprehensive review of available well records is necessary to ensure that there are no residential wells near the site. Assuming that there are still very limited individual well(s) in the vicinity of the site, the above public water supply system is easily made available in the vicinity for immediate hookup without the installation of an extensive piping system.

Whether the groundwater aquifer(s), if present under and near the site, is contaminated cannot currently be assessed, due to the lack of a groundwater monitoring program for the area. However, based on the westward groundwater flow, existing residential wells, if present, seem to be closely located but side-gradient from the site and may potentially be threatened by the site contamination, provided that the depression cones created by these individual wells overlap the potentially contaminated groundwater plume(s). A follow-up investigation of this problem is advisable.

1.3.6 Surface Hydrology

San Juan County depends heavily on surface waters. The Animas and San Juan Rivers in the county are the largest streams flowing perennially. Most of the other stream channels, in the county however, are ephemeral or intermittent. Groundwater flowing from bedrock sources also persumably contribute to stream flows in small quantities (Stone, 1983).

The San Juan and Animas Rivers originate in Colorado and flow through the State of New Mexico. The San Juan River, joined by the Animas River at Farmington, flows westward along an arcuate course and leaves the state near Four Corners.

Surface runoff from the site is normally scarce, because the annual precipitation only averages approximately 7 inches. However, during storms with an intensity averaging about 2.5 inches for a typical 10-year 24-hour rain storm, surface runoff from the site can be excessive. Locally, runoff from the site and its vicinity drains into the Stevens Arroyo, flows westward, and eventually empties into the San Juan river.

1.3.7 Land Use, Population, and Distribution

Early settlers came from Colorado to the Farmington area in 1876. Major enterprises of these settlers were farming and cattle raising. Alfalfa and such fruit as apples, pears, and peaches were the major crops. Abundant rangeland lent itself to the cattle business.

In 1900, the first gas and oil production wells were drilled near Farmington, marking the start of an industry that plays a major role in the employment and economy of the area.

A town of approximately 25,000 residents, Farmington is located approximately 13 miles east of the site. Aztec, the San Juan County seat, is located approximately 30 miles northeast of the site. The population of northeastern San Juan County is about 50,000 (USDA/SCS, 1980).

TABLE 1-3. HYDROGEOLOGIC PROPERTIES OF ALLUVIAL VALLEY AQUIFERS IN THE STUDY REGION

PROPERTY	UNIT	RANGE OF VALUES	TYPICAL VALUE
Hydraulic Conductivity	ft/day	1-1,500	100
Saturated Thickness	feet	0-350	50
Transmissivity	sq. feet/day	0-30,000	5,000
Porosity	percent (%)	10-40	30
Specific Yield	percent (%)	1-25	15
Specific Capacity	gal/min.-ft of drawdown	1-200	20
Water Table Gradient	feet/mile	5-100	10
Flow Velocity	feet/day	1.3	----

Source: Wilson, L., 1981. Potential for Groundwater Pollution in New Mexico. New Mexico Geological Society, Special Report No. 10, pp. 47-54.

Winds blow predominantly from the east and west as a result of the chanelling effect of the San Juan Valley. Spring is the windiest season, with an average windspeed of 10 miles per hour. Winds of 25 miles per hour or greater occur only 1 percent of the time, but they occasionally entrain dusts when the soil is dry. (op. cit.).

1.3.9 Natural Resources

Natural resources in the region include soil, water, coal, natural gas, and oil. Cattle that graze the rangeland and crops produced on farms are marketable products from the soil. Water for irrigation, industry, municipalities, and recreation is primarily supplied by the San Juan, Animas, and La Plata Rivers (USDA/SCS, 1980).

The area contains part of a field of strippable coal containing an estimated 6 billion tons. An abundance of additional coal lies beyond the strippable depths at 150 feet. Coal is mined for use by two power generating plants. (op. cit.).

Since 1951, the gas and oil industry has contributed greatly to the economy of the area. Ninety-eight percent of the gas produced in the area comes from Upper Cretaceous rock at a depth of 1,000 to 8,500 feet. Farmington Sandstone, the Fruitland Formation, and Pictured Cliff Sandstone are the most important geologic formations (Stone, et al., 1983).

1.3.10 Other Unique Features

The site is located about 0.3 mile northeast of the El Paso Natural Gas Company (EPNG) San Juan River plant. The water supply to the plant is from the San Juan River (N.M. EID, 1986). The plant property contains a large pond system, which might be used to hold industrial discharges. The pond system is located immediately east of San Juan County Route 6500, a paved road (**Figure 1-2**). During the 21 November 1985 area reconnaissance, the pond water was observed to be deep red or discolored. This pond system appears to be located side-gradient from the site. Whether the pond system is a potential offsite source of contamination cannot be determined due to the present lack of information regarding its exact contents.

1.3.11 Potential Receptors

The foregoing information indicates that land users who might be affected by releases of hazardous substances on or from the site are:

- Neighboring residents and workers;
- A few users, if any, of the shallow groundwater aquifer for drinking and other domestic purposes; and
- Onsite workers, scavengers, waste disposers, and occasional site trespassers and visitors.

In summary, the three major concerns are:

(1) The wastes in the inactive old dump pit and the new septic tank waste pit and their associated contaminated soils;

During the PA site visit, a field reconnaissance of the immediate site vicinity revealed that, within a 1 mile radius of the site, there are approximately 60 housing units with an estimate population of about 230 individuals. Within a 2-mile radius, there are about 187 houses with an estimated population of 960, including 710 permanent residents, and a transient population of 200 people at the nearby Macu Racetrack. The site is visited by an estimated transient population of 50 people, including onsite workers, waste disposers, scavengers, and occasional site trespassers and visitors. The cited permanent and transient population groups in the area would be potential receptors of the site contamination.

1.3.8 Climate

San Juan County, is located in a high plateau that is dissected in the north by the San Juan River Valley. Distant high mountains shield the plateau and valley from precipitation and from shallow, extremely cold air masses in winter. The area is arid to semi-arid. Water, therefore, plays a key role in land development. Precipitation varies considerably. Summer shower activity in this area is less frequent and intense than in most of the northwestern half of New Mexico.

Approximately 60% of the total precipitation occurs during summer months as local, often intense thunderstorms (Stone, et al., 1983). An average of 40 thunderstorms a year occur, occasionally accompanied by hail. Precipitation totals are slightly greater in winter than in spring and fall. (op. cit.).

Annual precipitation ranges from an average of 7 inches in the valley at Fruitland to 12 inches along the Colorado border. Average annual precipitation generally increases as elevation increases. Wide variations in the amount of precipitation may occur from year to year. Record lows and highs of annual precipitation of 2 and 24 inches, respectively, have been measured. Annual precipitation is 2 to 3 inches less in the valley near Farmington (op. cit.). The recorded 10-year and 1-year 24-hour rainfalls in the region are 2.5 and 1.2 inches, respectively.

Snowfall occurs from November through April. Total snowfall ranges from about 9 inches in the valley to more than 20 inches along the Colorado border. The higher mountains in Colorado receive more snow and are the main source of irrigation water for the eastern part of San Juan County. (op. cit.).

Temperatures rarely reach 100°F or higher, and only a few days each year have temperatures of zero or lower. Continental-like average daily temperature fluctuations of 33 degrees are common. Mean temperaturs of 67°F (maximum) and 37°F (minimum) were reported for Farmington. (op. cit.).

Evaporation from May through October averages 49 inches at Farmington, but may be as much as 25 percent higher on the plateau, where there is much more wind. Sunshine may be expected about 70 percent of the possible hours. (op. cit.).

Average relative humidity is about 50 percent, and ranges from about 70 percent early in the morning to about 30 percent in the afternoon. Late in spring and early in summer the humidity averages 15 to 20 percent in the afternoon. In winter and early in spring, fog occassionally occurs in the valley for brief periods. (op. cit.).

(2) The potential contamination of groundwater aquifers, if present beneath the site, by the onsite wastes and other potential offsite source(s) [e.g., El Paso Natural Gas Co.'s industrial storage pond system]; and

(3) The health hazards to a few nearby residents, if any, still relying on groundwater for drinking and other domestic uses.

2.0 SITE HISTORY AND OWNERSHIP

Approximately twenty acres of the site were originally operated for grazing under the name Taylor Grazing Land. Subsequently, the leasers of the site relinquished their rights in favor of a San Juan County application for use of the land for recreation and public purposes. Land belonging to the BLM was determined to be suitable primarily for use as a sanitary landfill. A total of 40.24 acres of land was officially leased to San Juan County to operate as a sanitary landfill for a period of 20 years beginning 21 May 1962. The lease was renewed on 10 January 1983 to continue the sanitary landfill operation. Pits or trenches excavated on site were used as surface impoundments to dispose of household trash, septic tank liquid, and carcasses. A history of site use, permit and regulatory actions, and remedial actions to date is presented in **Table 2-1.**

TABLE 2-1. SITE CHRONOLOGY

Site: Kirtland Site, Farmington, San Juan County, New Mexico
BLM Site Code: NM 0000000000
AEPCO Site No. 2, Group A

Date	Event
02/02/61	An affidavit was prepared by leaser relinquishing the rights to Taylor Grazing Land, consisting of 20 acres, in favor of San Juan County for recreation and public purposes.
04/30/62	A land classification statement was prepared by Theo E. Anhder of BLM stating the terms and conditions to which San Juan County must obligate before the issuance of the lease for 40.24 acres of land.
05/21/62	An official lease of the site to San Juan County to operate as a sanitary landfill for a period of 20 years was signed by all parties, along with other legal documents, including stipulations, a development and management plan, and assurance of compliance.
02/20/68	An onsite examination was conducted on 6 and 7 February 1968 and a report was prepared by C.H. Roberts, BLM Realty Specialist. The report stated that the San Juan County Commissioners and San Juan County Health Department be notified of the urgent need of erecting fences around the site and coverage of refuse where needed.
04/05/68	Correspondence from Peter A. Gutierrez (Acting Chief, Branch of Lands, BLM State Office) to San Juan County Commissioners requesting compliance with lease stipulations.
04/23/68	A letter report and a schedule of clean-up work done at the landfill was prepared by A. R. Schmitt (San Juan County Manager) and sent to Peter Gutierrez (Acting Chief, Branch of Lands, BLM State Office).
07/31/68	A report was prepared by C.H. Roberts, BLM Realty Specialist and reviewed by Warren J. Corby, BLM District Manager, which stated that a steel post net-wire fence was erected around the site.
08/07/68	A letter report concerning an on-the-ground examination was sent by Peter Gutierrez (Acting Chief, Branch of Lands, BLM New Mexico State Office) to the San Juan County Commissioners. The construction of a steel post net-wire fence around the exterior boundary of the site was mentioned in the report.

TABLE 2-1. SITE CHRONOLOGY (Continued)
Kirtland Site, Farmington, N.M.

Date	Event
10/01/68	A notice of stipulation violations on the method of operation and condition of the landfill was prepared by Samuel Davalos of BLM's Solid Waste Disposal Unit, Farmington Resource Area (FRA) and delivered to Rodell Schmitt, San Juan County Manager concerning scattered debris, decaying carcasses, flies, rodents, odors and placement of new trenches, fencing, cattle guards, and proper signs.
03/05/73	A similar notice was prepared and delivered by Phil Kirk, BLM FRA to Robert Bacon, San Juan County Manager to pay immediate attention to correcting the problems at the site.
07/30/81	The San Juan County Public Works Department wrote to Doug Burger of BLM FRA expressing the need to provide extra land (20 acres or so) to avoid possible dangers of fire in open pits at the existing landfill.
09/09/81	Gregory Church, Environmentalist III, State of New Mexico Environmental Improvement Division sent a Solid Waste Inspections Notice to Jim Dacy, San Juan County Public Works citing violations such as trash blowing and discontinuous fencing around the cattle guard.
10/22/81	San Juan County Public Works Department requested BLM New Mexico State Office to renew the site lease for an additional five years.
05/10/82	The Director of San Juan County Public Works replied to BLM (Robert Reed) that all violations in the 30 April 1982 citation had been corrected. A Realty Specialist from DOI/BLM, in an internal memorandum to the Area Manager recommended renewal of the lease.
08/27/82	A Realty Specialist from DOI/BLM in an Internal Memorandum to the Area Manager recommended renewal of the lease based on the San Juan County letter of 10 May 1982 reporting corrections of violations and on the BLM examination of landfills on 23 and 24 August 1982.
09/02/82	A notice of stipulation violation was prepared and delivered by Richard Watts, BLM Acting Area Manager to C.C. Cash of the San Juan County Department of Public Works concerning hazards to cattle from the exposed trash.
01/10/83	An official renewal of lease of the site to San Juan County to operate as a sanitary landfill was signed by all parties along with stipulations, a development plan, and assurance of compliance.

TABLE 2-1. SITE CHRONOLOGY (Continued)
Kirtland Site, Farmington, N.M.

Date	Event
01/17/85	San Juan County expressed no objection to a proposed northwesterly pipeline crossing the Kirtland site. (Hall, 1983)
04/09/84	The agreement between Public Service Company of New Mexico, City of Farmington, San Juan County and the BLM on the location of existing powerlines in relation to Kirtland site was confirmed by Mat Millenbach BLM Area Manager, in a letter to C. C. Cash of the San Juan County Department of Public Works.
05/02/85	A report on public landfills in San Juan County was prepared by a BLM FRA Supervisory Realty Specialist and sent to the FRA Manager in an internal memorandum concerning a hazardous waste prohibited sign and the users of pits.
09/27/85	A compliance check of the Kirtland site by BLM FRA personnel revealed the presence of "No Hazardous Waste" and "No Liquid Waste" signs, a nearly dry septic tank, and a new trench construction along the southern boundary of the landfill (BLM internal memorandum.)

3.0 SITE RECONNAISSANCE

3.1 Purpose

The AEPCO field team conducted a site reconnaissance during the PA to:

- Identify the unique site features including waste disposal areas, ponds, depression areas, utilities, drainage patterns, seeps, drums, odors, vegetation under stress, discoloration, and site boundaries.
- Identify potential sampling locations and collect sample(s) of surface water, groundwater, soils, waste, biota, and sediments, when appropriate.
- Take representative photographs of the site.
- Conduct air quality monitoring using an hNu meter, an explosimeter/oxygen meter, methane detector, and a radiometer.
- Observe surface soil and geological characteristics.
- Identify access routes and potential access problems, if any, for future investigations.
- Assess potential health and safety hazards.
- Inspect downgradient surface water discharge areas visually for signs of contamination (water pollution, vegetation under stress, and effects on wildlife).
- Identify potential offsite waste sources, such as spills and/or migration paths.
- Observe regional geologic patterns (e.g., bedrock outcrops).
- Estimate surface water flow rates, if any.

3.2 Field Observations

The AEPCO field team conducted a site reconnaissance on 21 November 1985 (Thursday). The sky was partly cloudy, temperatures were in the mid 30s^{O}F, and winds were from northwest at 15-20 mph, and ground surface was wet from melting snow.

The site was once a cattle grazing land. Following excavation of pits or trenches for disposal of sanitary materials, septic waste, and carcasses, the site has been drastically modified and is now characterized by undulating terrain. Part of the land south and southwest of the site is residential and industrial. Approximately 3 to 5 acres of formerly used disposal area is covered with soil. The site, as noted, contains three pits (a new septic tank waste pit, a dead animal pit, and an inactive old dump pit), a new landfill trench, a dry ditch at the northern portion, and a low-lying undeveloped area further north shielded by distant high hills and mountains.

The unwooded site lacks distinct vegetation. Small grass patches in undisturbed areas were dry. Two parallel power lines pass through the southern portion of the site. Based on the site resonnaisance, no other utility lines (e.g., telephone, telecommunication, or gas) exist within the site.

Visual observations indicate that wastes have been deposited in an inactive old pit on the north central border of the site. It appears that sludges and still bottoms were originally and illegally deposited in this pit. The sludge in the old pit appeared dry, and was light brown in color with red patches. Sampling of these wastes revealed the presence of dark black oily and greasy materials at approximately 1 to 1.5 feet depth. No distinct odors were noticed but air quality measurements registered 5 ppm benzene equivalent indicating that the old pit may be a potential emission source of volatile organic substances at that depth. No drums or industrial/commercial containers were noticed in the pits, the landfill trench, or the ditch. Wastes and waste piles were limited to the pits and the new landfill trench. None of these pits and trenches have been lined (N.M. EID, 1986). Thus, they could be a potential source of contamination to the shallow unconsolidated aquifer(s), if present beneath the site, or the bedrock groundwater aquifer.

3.3 Air Monitoring

The locations of air monitoring stations are shown in **Figure 1-2**. **Table 3-1** provides a quick reference to the locations and air quality measurements made at different stations on site.

No contaminated air was noted in the vicinity of and downwind from the site. However, air quality measurements taken during the site reconnaissance as part of the waste sampling effort at approximately 1 foot depth in the old dump pit, as mentioned, registered a 5 ppm benzene equivalent indicating some air pollution problem. The hNu and explosimeter readings taken above stirred water near the septic waste pit and offsite downwind (generally to the southwest) all showed background readings.

Sampling stations and liquid sample monitoring stations are shown in **Figure 1-2**.

The air monitoring data revealed that toxic contaminants exist in soil and sediment mixtures in the old dump pit. Some of these contaminants were confirmed to be volatile by the hNu meter. If the wastes and contaminated soils are not disturbed, risk exposure via the air route is considered minimum. However, for any site activities, potential exposure via direct contact with the wastes and contaminated soils cannot be ruled out, and should be avoided by wearing protective clothing.

No data are available on the potential for fire and explosions on this site. Much of the wastes disposed on the site are buried and, unless disturbed, should pose a minimum fire and/or explosion threat. Although volatile organics are present in the old dump pit, it is not clear whether the wastes are flammable.

TABLE 3-1. SUMMARY OF PA ENVIRONMENTAL MONITORING PROGRAM AND RESULTS

KIRTLAND SITE, FARMINGTON, SAN JUAN COUNTY, N.M.
AEPCO SITE NO. 02, GROUP A
BLM SITE CODE: NM 0000000000

							EXPLOSIMETER/ OXYGEN METER				
MONITORING STATION	DATE	MILITARY TIME	LOCATION	hNu PHOTO-IONIZER (ppm Benzene)	METHANE DETECTOR (ppm)	RADIOMETER (mR/hr)	OXYGEN* (%)	EXPLOSION LEVEL (%)	WIND DIRECTION	WIND SPEED (mph)	OTHER FIELD OBSERVATIONS
01	21-Nov-85	11:07	Western edge of the site on the top of a bank	0.3	0	0.01	17.8	0.00	Northwest	15-20	-----
02	21-Nov-85	11:14	Tail end of a drainage ditch on the western edge of the site	0.3	0	0.01	17.8	0.00	Northwest	15-20	Yellowish brown and sandy
03	21-Nov-85	11:23	Western edge of the old pit	0.3	0	0.01	17.8	0.00	Northwest	15-20	-----
04	21-Nov-85	11:25	Northern edge of the old pit	0.3	0	0.01	17.8	0.00	Northwest	15-20	-----
05	21-Nov-85	11:31	Central portion of the old pit (1 ft. below the surface)	5.0	0	0.01	17.8	0.00	Northwest	15-20	Oily and greasy mat at 1 ft. depth and black sludge
06	21-Nov-85	11:41	Septic waste pit	0.3	0	0.01	17.8	0.00	Northwest	15-20	Greasy material

* Low oxygen concentration may be due to high altitude.

4.0 CHARACTERISTICS AND ENVIRONMENTAL CONCENTRATIONS OF HAZARDOUS SUBSTANCES

The material in this section on the characteristics and environmental concentrations of hazardous substances on and off site was compiled from recent environmental sampling and laboratory analyses, which were performed coincidentally with the present study.

4.1 Environmental Sampling and Analyses Program

As part of the Preliminary Assessment (PA), the AEPCO field investigation team established an environmental monitoring and sampling network on 21 November 1985 to monitor the air quality, assess health and safety conditions, and collect a representative composite waste/sediment/soil sample, and a grab surface water/liquid waste sample. This environmental monitoring and sampling network consists of:

- One composite waste sample (WS-A) from Stations 02 to 06 (**Figure 1-2**); and
- One grab surface water/liquid waste sample (SW-A) from the new septic waste pit (**Figure 1-2**).

Table 3-1 and **Figure 1-2** provide a quick reference to the locations of these sampling stations and air quality monitoring stations.

4.2 Air Quality and Health and Safety

Organic vapor analyzer (hNu meter), methane detector, radiometer, explosimeter, and oxygen meter readings were taken at each station. Hydrogen sulfide-sensitive badges were also worn during the field investigation. All of the instrument and badge readings were used to assist the team in evaluating health and safety requirements. The readings also provided clues to areas that might contain volatile hazardous organic substances.

After background levels were established, it was determined that modified Level C health and safety protection would be adequate for the field work. Thus, full-face self-purifying respirators were carried by the team members at all times during the site investigation for use during unanticipated adverse site conditions. However, no conditions were subsequently met that required the use of the respirators.

The monitoring results are summarized in **Table 3-1**. The results revealed that the background levels in ambient air were:

- 0.3 ppm benzene equivalent for volatile organic vapor concentrations as measured by an hNu photoionizer;
- methane concentration below detection limit;
- 0.01 to 0.02 mRem/hour gross radioactivity;
- 17.8% oxygen concentration due to the high altitude of the project site; and
- 0.001% explosimeter reading.

Instrument readings throughout the site were consistent with background levels with the exception of one hNu reading at Station 05. This station was located within the old dump pit, into which hazardous wastes may have been dumped. One spontaneous reading of 5 ppm in the headspace of the wastes was detected at 1 foot depth. This high reading is indicative of the presence of highly volatile organic substances. Thus, a representative sample was collected for a composite sample for laboratory analysis. Hydrogen sulfide-sensitive badge data suggested that H_2S concentrations were low or negligible (at least in the breathing zone of the field personnel).

In summary, Level C protection without a full-face self-purifying respirator was adequate for the site reconnaissance. However, if excavation work in the inactive old dump pit is planned, health and safety protection in strict compliance with Level C specifications, at a minimum, is strongly recommended.

4.3 Location of Hazardous Substances on Site

Figure 1-2 shows a general layout of the project site. The dimensions of the new septic waste pit and the old dump pit and water marks are signs that the site may possibly contain approximately 11,000 cubic yards of liquid, semi-solid, and solid wastes, not necessarily all hazardous, resulting from unrestricted or unauthorized dumping of a variety of wastes including petroleum industrial wastes. The hazardous contaminants are estimated to cover a surface area of 0.5 acre occupied by the new septic waste pit on the western corner and 8-12 acres occupied by the inactive old dump pit at the northcentral border of the site.

Particular concerns are the:

(1) uncontrolled release of wastes via erosion of a containment dike into a nearby ditch, thence the Stevens Arroyo, and subsequently San Juan River;

(2) leaching of hazardous substances into the shallow unconsolidated aquifer, if present, and possibly the bedrock aquifer beneath the site and migration of contaminants via the groundwater systems off site;

(3) potential hazards to a few nearby residents, if any, still using the groundwater as a water supply for drinking and other domestic purposes; and

(4) potential hazards to the transient population including site workers, waste disposers, scavengers, and occasional trespassers and visitors.

4.4 Form and Physical State of Hazardous Wastes

No records were kept of the volumes of wastes dumped nor the exact dates on which they were dumped. The abundance of greasy substances in onsite wastes suggests that area petroleum refineries and gas production facilities might have disposed petroleum wastewater or waste on site in addition to the septic wastes.

Most of the wastes disposed at the site had presumably been in bulk pumpable form and were contained in the old dump pit and the new septic waste pit. Air monitoring results and the presence of greasy materials suggest that industrial wastes and possibly petroleum wastes have been disposed at the site. The onsite pits and trenches have not been lined (N.M. EID, 1986), hence, the potential exists for leaching of hazardous substances into soils and groundwater aquifer systems, if any.

The laboratory results of onsite PA waste samples reveal that onsite wastes are noncorrosive, highly volatile, potentially flammable, and nonreactive. Some of the substances in the wastes are considered toxic. Acute toxicity from short-term exposure is unlikely. However, potential chronic health effects from long-term exposure to the wastes cannot be conclusively ruled out.

4.5 Laboratory Analysis of Hazardous Wastes on Site

Tables 4-1 to 4-5 summarize the results of the laboratory analysis of the samples. One composite sample was collected for the solid medium representing the wastes from five stations (**Figure 1-2**). One grab sample representing the liquid waste/surface water was collected from the septic waste pit. The results of the laboratory analysis are discussed below.

Ignitability (Table 4-1)

The composite waste sample showed an ignitable flash point greater than 100°C. Owing to the compositing technique used, the waste sample may contain soil materials, which tend to increase the flash point to a level higher than that which would be exhibited by an actual waste substance.

Corrosivity (Table 4-1)

The waste sample was subjected to the corrosivity test in accordance with the Resource Conservation and Recovery Act (RCRA). The waste pH was determined to be 8. Based on this pH value, the waste is not considered to be corrosive.

Reactivity (Table 4-1)

The waste sample was subjected to the reactivity test specified in the RCRA. No reaction products such as hydrogen sulfide or hydrogen cyanide were detected. Therefore, the waste is considered nonreactive.

Extraction Procedure (EP) Toxicity Test Results and Total Organic Halogens (TOH) (Table 4-1)

The extractants from the waste sample subjected to the RCRA EP Toxicity test contain heavy metals, however, at concentrations below EPA contract detection limits, with the exceptions of barium at 230 ug/L and lead at 44 ug/L. These low concentrations of heavy metals are well below the applicable RCRA standards and are not considered hazardous.

The liquid waste/surface water sample contained concentrations of heavy metals that were less than the lower values of applicable National Interim Primary and Secondary Drinking Water Standards, with the exceptions of chromium (300 ug/L), copper (1,570 ug/L), manganese (7,120 ug/L), and lead (2,070 ug/L).

TABLE 4-1
CONCENTRATIONS OF HSL METALS AND OTHER PARAMETERS IN WASTES AND SURFACE WATER

KIRTLAND SITE, FARMINGTON, SAN JUAN COUNTY, N.M.
AEPCO SITE 2, GROUP A
BLM SITE CODE: NM 0000000000

	WASTE				SURFACE WATER			NATIONAL DRINKING WATER STANDARD#
PARAMETER	UNIT	STATION WS-A*	DETECTION LIMIT**	RCRA STANDARD***	UNIT	STATION SW-A	DETECTION LIMIT**	
Silver (Ag)	ug/L	<10 U	10	5,000	ug/L	<10 U	10	50
Arsenic (As)	ug/L	{6.7}	10	5,000	ug/L	17.0	10	50
Boron (B)	ug/L	---	---	---	ug/L	2,165	---	---
Barium (Ba)	ug/L	230	200	100,000	ug/L	---	---	---
Beryllium (Be)	ug/L	---	---	---	ug/L	7.0	5	---
Cadmium (Cd)	ug/L	<5	5	1,000	ug/L	23	5	10
Cobalt (Co)	ug/L	---	---	---	ug/L	94	50	---
Chromium (Cr)	ug/L	10	10	5,000	ug/L	300	10	50
Copper (Cu)	ug/L	---	---	---	ug/L	1,570	25	1,000
Mercury (Hg)	ug/L	<0.2 U	0.2	200	ug/L	<0.2 U	0.2	2
Manganese (Mn)	ug/L	---	---	---	ug/L	7,120	15.0	50
Nickel (Ni)	ug/L	---	---	---	ug/L	205	40	---
Lead (Pb)	ug/L	44	40	5,000	ug/L	2,070	5	50
Selenium (Se)	ug/L	<4 U	5	1,000	ug/L	<4 U	5	10
Thallium (Te)	ug/L	---	---	---	ug/L	<3 U	10	---
Vanadium (V)	ug/L	---	---	---	ug/L	129 U	50	---
Total Organic Halogen (TOH)	ug/L	---	---	---	ug/L	476	---	---
Ignitability: Flash Point	deg. C	>100	---	---	---	---	---	---
Corrosivity: pH	Std. Unit	8##	---	<2 or >12	---	---	---	---
Reactivity:								
Total Sulfide	ug/Kg	3	---	---	---	---	---	---
Total Cyanide	ug/Kg	<5	---	---	---	---	---	---

WS-A = Waste Sampling Station A
SW-A = Surface Water Sampling Station A
U = Not detected or below detection limit
* Extraction Procedure (EP) toxicity test results
** EPA detection limits based on zero dilution
*** Resource Conservation and Recovery Act
# Lower Value of National Interim Primary and Secondary Drinking Water Standards
pH greater than 2 and less than 12 indicates noncorrosive characteristics.
{ }: indicates the substance is found above the laboratory's limit,
but below EPA contract required detection limit.
NONE: Indicates non-reactivity ovserved.
--- Not applicable or analysis not requested.

TABLE 4-2
CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS (VOCs) IN WASTES AND SURFACE WATER

KIRTLAND SITE, FARMINGTON, SAN JUAN COUNTY, N.M.
AEPCO SITE 2; GROUP A
BLM SITE CODE: NM 0000000000

	WASTE			SURFACE WATER		
PARAMETER	UNIT	STATION WS-A	DETECTION LIMIT	UNIT	STATION SW-A	DETECTION LIMIT
Acrolein	ug/Kg	ND	100	ug/L	ND	10
Acrylonitrile	ug/Kg	ND	100	ug/L	ND	10
Benzene	ug/Kg	106	100	ug/L	2 U	10
Carbon Tetrachloride	ug/Kg	ND	100	ug/L	ND	10
Chlorobenzene	ug/Kg	ND	100	ug/L	ND	10
1,2-Dichloroethane	ug/Kg	ND	100	ug/L	ND	10
1,1,1-Trichloroethane	ug/Kg	ND	100	ug/L	4 U	10
1,1-Dichloroethane	ug/Kg	ND	100	ug/L	ND	10
1,1,2-Trichloroethane	ug/Kg	ND	100	ug/L	ND	10
1,1,2,2-Tetrachloroethane	ug/Kg	ND	100	ug/L	ND	10
Chloroethane	ug/Kg	ND	100	ug/L	ND	10
2-Chloroethylvinylether	ug/Kg	ND	100	ug/L	ND	10
Chloroform	ug/Kg	ND	100	ug/L	ND	10
1,1-Dichloroethylene	ug/Kg	ND	100	ug/L	ND	10
1,2-trans-Dichloroethylene	ug/Kg	ND	100	ug/L	ND	10
1,2-Dichloropropane	ug/Kg	ND	100	ug/L	ND	10
1,3-Dichloropropylene	ug/Kg	ND	100	ug/L	ND	10
Ethylbenzene	ug/Kg	24 U	100	ug/L	ND	10
Methylene Chloride	ug/Kg	ND	100	ug/L	ND	10
Methyl chloride	ug/Kg	ND	100	ug/L	ND	10
Methyl bromide	ug/Kg	ND	100	ug/L	ND	10
Bromoform	ug/Kg	ND	100	ug/L	ND	10
Dichlorobromomethane	ug/Kg	ND	100	ug/L	ND	10
Trichlorofluoromethane	ug/Kg	ND	100	ug/L	ND	10
Dichlorodifluoromethane	ug/Kg	ND	100	ug/L	ND	10
Chlorodibromomethane	ug/Kg	ND	100	ug/L	ND	10
Tetrachloroethylene	ug/Kg	ND	100	ug/L	ND	10
Toluene	ug/Kg	49 U	100	ug/L	520	10
Trichloroethylene	ug/Kg	ND	100	ug/L	ND	10
Vinyl Chloride	ug/Kg	ND	100	ug/L	ND	10
Total Xylenes	ug/Kg	379	100	ug/L	ND	10
DILUTION RATIO	---	10X	10X	---	1X	1X

WS-A = Waste Sampling Station A
SW-A = Surface Water Sampling Station A
U = Not detected or below detection limit
--- Not applicable

TABLE 4-3
CONCENTRATIONS OF ACID EXTRACTABLE ORGANIC COMPOUNDS IN WASTES AND SURFACE WATER

KIRTLAND SITE, FARMINGTON, SAN JUAN COUNTY, N.M.
AEPCO SITE 2; GROUP A
BLM SITE CODE: NM 0000000000

ACID EXTRACTABLE ORGANIC COMPOUNDS

	WASTE			SURFACE WATER		
PARAMETER	UNIT	STATION WS-A	DETECTION LIMIT	UNIT	STATION SW-A	DETECTION LIMIT
Benzoic Acid	mg/Kg	ND	5,000	ug/L	ND	500
2,4,5-Trichlorophenol	mg/Kg	ND	5,000	ug/L	ND	500
2,4,6-Trichlorophenol	mg/Kg	ND	1,000	ug/L	ND	100
p-Chloro-m-cresol	mg/Kg	ND	1,000	ug/L	ND	100
2-Chlorophenol	mg/Kg	ND	1,000	ug/L	ND	100
2,4-Dichlorophenol	mg/Kg	ND	1,000	ug/L	ND	100
2,4-Dimethylphenol	mg/Kg	ND	1,000	ug/L	ND	100
2-Methylphenol	mg/Kg	ND	1,000	ug/L	ND	100
4-Methylphenol	mg/Kg	ND	1,000	ug/L	ND	100
2-Nitrophenol	mg/Kg	ND	1,000	ug/L	ND	100
4-Nitrophenol	mg/Kg	ND	5,000	ug/L	ND	500
2,4-Dinitrophenol	mg/Kg	ND	5,000	ug/L	ND	500
4,6-Dinitro-o-cresol	mg/Kg	ND	5,000	ug/L	ND	500
Pentachlorophenol	mg/Kg	ND	5,000	ug/L	ND	500
Phenol	mg/Kg	ND	1,000	ug/L	480	100
DILUTION RATIO	---	100X	100X	---	10X	10X

WS-A = Waste Sampling Station A
SW-A = Surface Water Sampling Station A
U = Not detected of below detection limit
--- Not applicable

TABLE 4-4
CONCENTRATIONS OF BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS IN WASTES AND SURFACE WATER

KIRTLAND SITE, FARMINGTON, SAN JUAN COUNTY, N.M.
AEPCO SITE 2; GROUP A
BLM SITE CODE: NM 0000000000

BASE AND NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS:

	WASTE			SURFACE WATER		
PARAMETER	UNIT	STATION WS-A	DETECTION LIMIT	UNIT	STATION SW-A	DETECTION LIMIT
Acenaphthene	mg/Kg	ND	1,000	ug/L	ND	10
Benzidine	mg/Kg	ND	1,000	ug/L	ND	10
1,2,4-Trichlorobenzene	mg/Kg	ND	1,000	ug/L	ND	10
Hexachlorobenzene	mg/Kg	ND	1,000	ug/L	ND	10
Hexachloroethane	mg/Kg	ND	1,000	ug/L	ND	10
bis (2-chloroethyl) ether	mg/Kg	ND	1,000	ug/L	ND	10
2-Chloronaphthalene	mg/Kg	ND	1,000	ug/L	ND	10
1,2-Dichlorobenzene	mg/Kg	ND	1,000	ug/L	ND	10
1,3-Dichlorobenzene	mg/Kg	ND	1,000	ug/L	ND	10
1,4-Dichlorobenzene	mg/Kg	ND	1,000	ug/L	16	10
3,3-Dichlorobenzidine	mg/Kg	ND	1,000	ug/L	ND	10
2,4-Dinitrotoluene	mg/Kg	ND	1,000	ug/L	ND	10
2,6-Dinitrotoluene	mg/Kg	ND	1,000	ug/L	ND	10
1,2-Diphenylhydrazine (as azobenzene)	mg/Kg	ND	1,000	ug/L	ND	10
Butl benzyl phthalate	mg/Kg	ND	1,000	ug/L	ND	10
Di-n-butyl phthalate	mg/Kg	ND	1,000	ug/L	ND	10
Di-n-octyl phthalate	mg/Kg	ND	1,000	ug/L	ND	10
Diethyl phthalate	mg/Kg	ND	1,000	ug/L	ND	10
Dimethyl phthalate	mg/Kg	ND	1,000	ug/L	ND	10
Benzo (a) anthracene	mg/Kg	ND	1,000	ug/L	ND	10
Benzo (a) pyrene	mg/Kg	ND	1,000	ug/L	ND	10
3,4-Benzofluoranthene	mg/Kg	ND	1,000	ug/L	ND	10
Benzo (k) fluoranthene	mg/Kg	ND	1,000	ug/L	ND	10
Fluoranthene	mg/Kg	ND	1,000	ug/L	ND	10
4-Chlorophenyl phenyl ether	mg/Kg	ND	1,000	ug/L	ND	10
4-Bromophenyl phenyl ether	mg/Kg	ND	1,000	ug/L	ND	10
bis (2-chloroisopropyl) ether	mg/Kg	ND	1,000	ug/L	ND	10
bis (2-chloroethoxy) methane	mg/Kg	ND	1,000	ug/L	ND	10
Hexachlorobutadiene	mg/Kg	ND	1,000	ug/L	ND	10
Hexachlorocyclopentadiene	mg/Kg	ND	1,000	ug/L	ND	10
Isophorone	mg/Kg	ND	1,000	ug/L	ND	10
Naphthalene	mg/Kg	ND	1,000	ug/L	ND	10
Nitrobenzene	mg/Kg	ND	1,000	ug/L	ND	10
N-Nitrosodimethylamine	mg/Kg	ND	1,000	ug/L	ND	10
N-Nitrosodiphenylamine	mg/Kg	ND	1,000	ug/L	ND	10
bis (2-ethylhexyl) phthalate	mg/Kg	ND	1,000	ug/L	ND	10
Chrysene	mg/Kg	ND	1,000	ug/L	ND	10
Acenaphthylene	mg/Kg	ND	1,000	ug/L	ND	10
Acenaphthylene	mg/Kg	ND	1,000	ug/L	ND	10
Anthracene	mg/Kg	ND	1,000	ug/L	ND	10
Benzo (ghi) perylene	mg/Kg	ND	1,000	ug/L	ND	10
Fluorene	mg/Kg	ND	1,000	ug/L	ND	10
Phenanthrene	mg/Kg	ND	1,000	ug/L	ND	10
Dibenzo (a,h) anthracene	mg/Kg	ND	1,000	ug/L	ND	10
Indeno (1,2,3-cd) pyrene	mg/Kg	ND	1,000	ug/L	ND	10
Pyrene	mg/Kg	ND	1,000	ug/L	ND	10
Benzyl alcohol	mg/Kg	ND	1,000	ug/L	12	10
DILUTION RATIO	---	100X	100X	---	1X	1X

WS-A = Waste Sampling Station A
SW-A = Surface Water Sampling Station A
U = Not detected of below detection limit
--- Not applicable

TABLE 4-5
CONCENTRATIONS OF PESTICIDES AND PCBs IN WASTES AND SURFACE WATER

KIRTLAND SITE, FARMINGTON, SAN JUAN COUNTY, N.M.
AEPCO SITE 2; GROUP A
BLM SITE CODE: NM 0000000000

PESTICIDES AND PCBs:

	WASTE			SURFACE WATER		
PARAMETER	UNIT	STATION WS-A	DETECTION LIMIT	UNIT	STATION SW-A	DETECTION LIMIT
Aldrin	ug/Kg	ND	1,000	ug/L	ND	10
Dieldrin	ug/Kg	ND	1,000	ug/L	ND	10
Chlorodane	ug/Kg	ND	1,000	ug/L	ND	10
4,4-DDT	ug/Kg	ND	1,000	ug/L	ND	10
4,4-DDE	ug/Kg	ND	1,000	ug/L	ND	10
4,4-DDD	ug/Kg	ND	1,000	ug/L	ND	10
alpha-Endosulfan	ug/Kg	ND	1,000	ug/L	ND	10
beta-Endosulfan	ug/Kg	ND	1,000	ug/L	ND	10
Endosulfan sulfate	ug/Kg	ND	1,000	ug/L	ND	10
Endrin	ug/Kg	ND	1,000	ug/L	ND	10
Endrin aldehyde	ug/Kg	ND	1,000	ug/L	ND	10
Heptachlor	ug/Kg	ND	1,000	ug/L	ND	10
Heptachlor epoxide	ug/Kg	ND	1,000	ug/L	ND	10
alpha-BHC	ug/Kg	ND	1,000	ug/L	ND	10
beta-BHC	ug/Kg	ND	1,000	ug/L	ND	10
gamma-BHC	ug/Kg	ND	1,000	ug/L	ND	10
delta-BHC	ug/Kg	ND	1,000	ug/L	ND	10
PCB-1016 (Aroclor 1016)	ug/Kg	ND	1,000	ug/L	ND	10
PCB-1221 (Aroclor 1221)	ug/Kg	ND	1,000	ug/L	ND	10
PCB-1232 (Aroclor 1232)	ug/Kg	ND	1,000	ug/L	ND	10
PCB-1242 (Aroclor 1242)	ug/Kg	ND	1,000	ug/L	ND	10
PCB-1248 (Aroclor 1248)	ug/Kg	ND	1,000	ug/L	ND	10
PCB-1254 (Aroclor 1254)	ug/Kg	ND	1,000	ug/L	ND	10
PCB-1260 (Aroclor 1260)	ug/Kg	ND	1,000	ug/L	ND	10
DILUTION RATIO	---	100X	100X	---	1X	1X

WS-A = Waste Sampling Station A
SW-A = Surface Water Sampling Station A
U = Not detected or below detection limit
--- Not applicable

Volatile Organic Compounds (VOCs) (Table 4-2)

As shown in Table 4-2, the waste sample contained elevated concentrations of:

- Benzene (106 ug/Kg); and
- Total xylenes (379 ug/Kg).

It should be noted that the waste sample was a composite of wastes from 5 stations. This composite technique may result in chemical concentrations much less than those of an actual waste without dilution by inert soil materials.

The grab liquid waste/surface water sample contained toluene (520 ug/L).

Acid Extractable Organic Compounds (Table 4-3)

No acid extractable organic compounds were found in the waste sample. However, the presence of phenol (480 ug/L) was confirmed in the aqueous medium.

Base/Neutral Extractable Organic Compounds (Table 4-4)

No base/neutral extractable organic compounds were found in the composite waste sample. Two compounds were detected in the liquid medium. They are 1,4-dichlorobenzene and benzyl alcohol at concentrations within a factor of 2 of EPA contract detection limits.

Pesticides and PCBs (Table 4-5)

No pesticides or PCBs were found to be present in either the waste or liquid waste/surface water samples. These results are consistent with earlier N.M. EID analytical findings.

4.6 Environmental Concentrations

Because of the limitation on the scope of the services, neither onsite nor offsite groundwater samples were taken during the site reconnaissance. The same is true for offsite surface water, sediment, and soils. Therefore, the environmental concentrations cannot be defined at the present time. Judging from the onsite permeable soils and the high mobilities of certain hazardous substances found in the waste and liquid samples, it is likely that some hazardous substances might have leached out and migrated off site via the shallow unconsolidated groundwater route, if any, or the bedrock groundwater route.

5.0 CONCLUSIONS

5.1 Major Study Findings

Air monitoring during the site reconnaissance generally revealed negligible contamination of air at and near the site. However, a 5 ppm benzene equivalent concentration of volatile organic vapor was detected in the headspace of the wastes 1-ft below the surface in the inactive old dump pit located on the northcentral border. This finding indicates a potential for the exposure of the public to the vapor via the air route.

A septic waste pit and an inactive old waste pit were reportedly used for the disposal of septic wastes, sludges, oily wastes, and petroleum industrial wastes. Approximately 11,000 cubic yards of wastes, not necessarily all hazardous, were estimated to be present in these pits as a result of unauthorized dumping.

These wastes are in solid, semi-solid, and liquid forms. The analytical findings for a composite waste sample collected during the PA indicated that the wastes contain elevated concentrations of highly volatile and mobile benzene and total xylenes. The grab surface water/liquid waste sample collected from the septic waste pit revealed the presence of chromium, copper, manganese, and lead above the lower values of the applicable National Interim Primary and Secondary Drinking Water Standards. The liquid medium also contains toluene, phenol, 1,4-dichlorobenzene, and benzyl alcohol.

Based on limited hydrogeologic information, the general area of the site is potentially underlayed by a shallow alluvial aquifer under groundwater table conditions (approximately 35 to 40 feet below the surface) and a bedrock aquifer. The shallow aquifer, if present beneath the site, is reportedly highly vulnerable to contamination from surface discharges of leachates or septic effluent and surface/subsurface contamination. No impervious layer that would serve to protect the shallow aquifer from contamination was evident. Lack of groundwater quality data at and near the site makes it difficult to identify and define the potential zone(s) of contamination in the shallow groundwater system, if any.

Bedrock in the area is fractured and its aquifer may be communicating with the upper shallow aquifer. Potential cross contamination of bedrock aquifer by the upper shallow aquifer, if present beneath the site, cannot be effectively ruled out unless an in-depth hydrogeologic study is conducted.

An industrial pond system located within the property of the El Paso Natural Gas Co. is located approximately 0.3 mile southwest of the site. During the 21 November 1985 area reconnaissance, the pond water was observed to be deep red or discolored. This pond system is unlined (N.M. EID, 1986). Whether it is a potential offsite source of contamination cannot be assessed due to lack of specific information. The pond is hydraulically located side-gradient from the site and may potentially play a role in regulating shallow or deeper groundwater aquifer flow in the area.

5.2 BLM Site Classification

Each site investigated as part of this project is classified into one of four BLM's categories:

Class I. There is no significant reason to believe that hazardous wastes or other hazardous substances have been generated, treated, stored, or disposed of on the site, or alternatively that hazardous wastes were disposed but in such quantities, forms, or under such conditions that there is negligible hazard to human health or the environment.

Class II. Hazardous wastes or other hazardous substances are present but there is small risk of onsite contact or release of contaminants to the environment in such form and quantity that would constitute a significant hazard to human health or to the environment.

Class III. Hazardous wastes or other hazardous substances exist on the site in such form and quantity and under such conditions that there is specific reason to believe that a potentially significant hazard to human health or the environment may exist and that further definitive investigations must be undertaken.

Class IV. Hazardous wastes or other hazardous substances exist on the site in such form and in such quantity and under such conditions, including offsite considerations, as to constitute an imminent and substantial endangerment to human health or the environment.

For the subject site, hazardous wastes or other hazardous substances were documented to be disposed or present on the site. Hazardous substances identified include:

- Solid medium: benzene and total xylenes
- Aqueous medium: chromium, copper, manganese, lead, toluene, phenol, 1,4-dichlorobenzene, and benzyl alcohol.

Some of these substances are highly volatile and toxic. However, the quantity, form, and degree of containment suggest that instances of acute toxicity from short-term exposure are currently unlikely to occur. Nevertheless, chronic health effects may result from long-term exposure to these substances by:

(1) A few nearby residents, if any, who may still rely on groundwater for drinking and other domestic purposes;

(3) Nearby residents via the air route and, to a lesser extent, direct contact; and

(2) Onsite personnel (e.g., workers, waste disposers, scavengers, and occasional trespassers and visitors) via the air route and, to a lesser extent, direct contact.

The potential exists that the shallow groundwater aquifer, if present beneath the site, and possibly bedrock aquifer may be contaminated due to high permeability of soils, lack of impervious clay layer for groundwater protection against contamination, and fractured bedrock. This concern is also supported by the documented presence of hazardous substances on site and potential offsite source(s) of contamination.

The above considerations justify the classification of the Kirtland Site as a Class III site, requiring further investigations. The scope of the recommended followup investigations is presented in Section 6.0.

6.0 RECOMMENDED ACTIONS

Initial remedial measures (IRMs) recommended to minimize potential exposure to onsite wastes and contaminated soils and prevent further complication of the site problem are:

- Establishment of effective site access control mechanisms such as placement of a security gate at the site entrance and implementation of a permit system to regulate waste disposers; and
- Improvements to the northern dike at the old waste pit to minimize the erosion potential and reduce the chance of offsite transport of waste materials via the surface water route;

Installation of new monitoring wells on and off the site is recommended to determine the hydrogeologic characteristics and groundwater quality at the site. The exact number of monitoring wells needed will be determined during the preparation of the work plan for this followup investigation. In addition, collection of well water samples from selected residential wells would assist in the determination of the extent of offsite contaminant migration, if any. Although, residential wells, if any, near the site are expected to be located side-gradient from the site, the potential of residential well contamination still exists if the depression cones created by these wells have extensively overlapped with the potentially contaminated groundwater plume(s).

Surface water/sediment sampling downgradient from the site would remedy data gaps to gain better understanding of the site contamination and contaminant migration problems via the surface water route.

Because of the potential multiple contamination sources (both onsite and offsite) in the study area, appropriate EPA, BLM, State of New Mexico, and San Juan County authorities and affected parties should be called upon to cooperatively undertake the followup investigations.

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